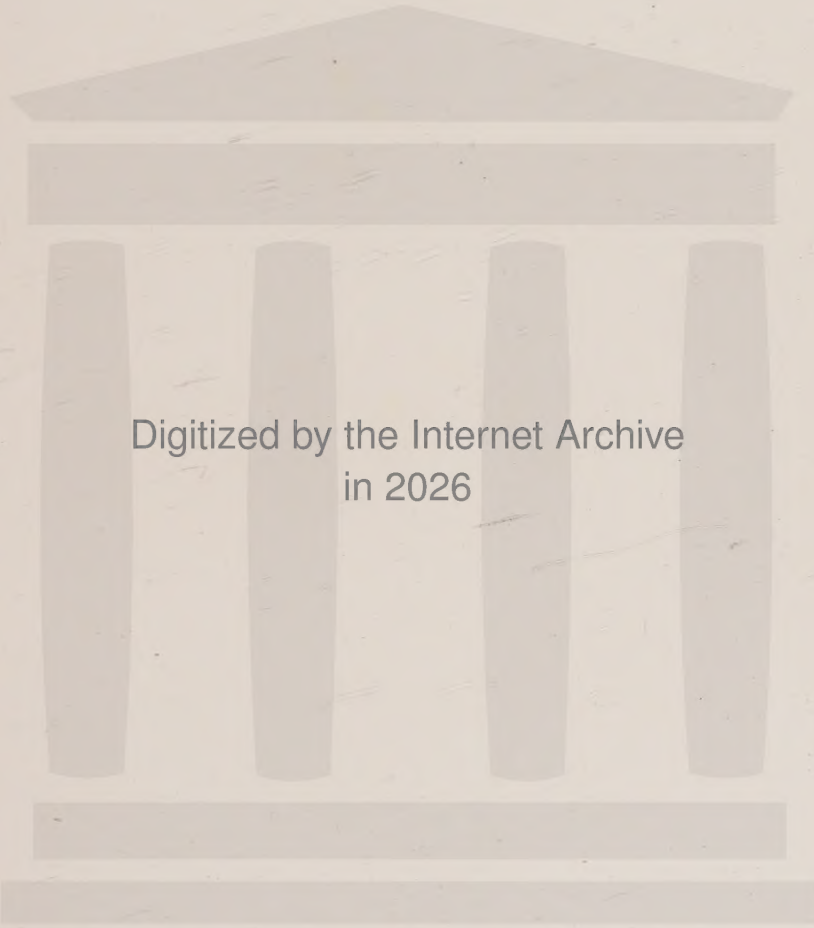


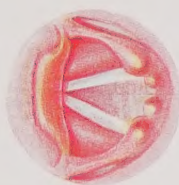


DISEASES OF THE THROAT,
NOSE AND EAR



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FIG. 1.
INSPIRATION.



DR. MORELL MACKENZIE'S CASE
OF ANEURYSM OF AORTA WITH
Pressure on Left Recurrent N.

FIG. 2.

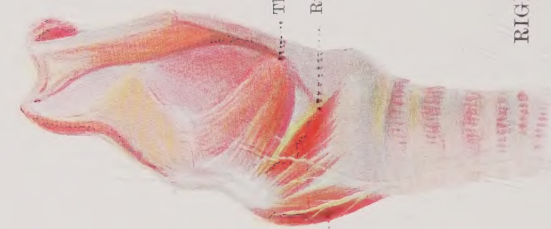
ATTEMPTED PHONATION.



Left Thyro-Arytenoid.
Left Crico-Arytenoid Lateralis
(Adductor).

Arytenoides P.
(Adductor).
Left,
Crico-Arytenoid,
Post.
(Abductor).

LEFT SIDE.



Thyro-Arytenoid, Right.
Right, Crico-Arytenoid, Lateral.
(Adductor).

RIGHT SIDE.

Paralysis of left recurrent laryngeal nerve with paralysis and atrophy of the left side of the larynx.
Above is the laryngoscopic image during quiet respiration (Fig. 1) and on attempted phonation (Fig. 2). From a case of the late Sir Morell Mackenzie's, painted by the late Lennox Browne, *vide* 'Trans. Path. Soc. Lond.,' 1870, xxi, p. 129.

I am indebted to Mr. E. Mayer for permission to use this drawing.

Henry Wagner ad m^o del^o 1870.

DISEASES OF THE THROAT, NOSE, AND EAR

BY

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VOL. I

SECOND EDITION

ST. LOUIS

THE C. V. MOSBY COMPANY

1928

INSCRIBED TO
SIR JAMES DUNDAS-GRANT
IN GRATEFUL RECOGNITION OF MUCH
KINDNESS

Made and printed in Great Britain.

PREFACE

THIS book has been written from the practical point of view, and for that reason many interesting scientific problems and issues have necessarily been omitted. On the other hand, considerable attention has been devoted to operative surgery, but here, also, limitation of space has rendered it impossible to describe the many modifications and variations of the operations.

In addition to the acknowledgments for the use of illustrations borrowed from other sources, I desire to offer my sincere thanks to Dr. Robert Knox, Dr. Andrew Wylie, Dr. William Hill, Dr. W. H. Kelson, Dr. Irwin Moore, Mr. W. M. Mollison, and Mr. J. Gay French for kindly granting me the loan of valuable blocks.

The original illustrations are for the most part the production of Mr. S. A. Sewell, who has succeeded admirably in giving pictorial expression to my suggestions and ideas.

For the photographs, I am indebted to the careful skill of Mr. J. Peach, of the Central London Throat and Ear Hospital.

The original of the coloured frontispiece is one of the drawings executed for Sir Morell Mackenzie by Lennox Browne, for long in the possession of Mr. E. Mayer, of Messrs. Mayer & Phelps, and recently presented by him, together with manuscripts and instruments belonging to Mackenzie, to the Royal Society of Medicine. As far as I am aware, the drawing has never before been reproduced.

I am deeply conscious of the debt I owe to Mr. Mayer for his generous permission to use this historical picture, and I am confident that all readers who benefit by its clear and graphic representation of the laryngeal features in recurrent laryngeal paralysis, will share my feeling of gratitude.

The case to which the drawing refers, by the way, is recorded, as

Dr. Irwin Moore has discovered, in the 'Transactions of the Pathological Society of London,' in 1870 (vol. xxi, p. 129). The following is the title and some of the notes :

"Aneurism of the arch of the aorta, causing pressure on the left recurrent laryngeal nerve, with paralysis and atrophy of the muscles of the left side of the larynx.

Specimen shown at the Path. Soc. of London by Morell Mackenzie. April 19th, 1870.

Laryngoscopic examination showed the left vocal cord immovably fixed between the side of the larynx and the median line and neither abducted in inspiration (Fig. 1) nor adducted on attempted phonation (Fig. 2).

P.M.—The muscles on the left side of the larynx were markedly atrophied. The left adductor (crico-arytenoideus posticus) was considerably paler and thinner than its fellow; the fibres on the left side of the arytenoideus proprius were also less developed than those on the other side, but the greatest difference was noticed in the crico-arytenoideus lateralis, the left muscle being nothing more than a few pale, scattered fibres, whilst the right muscle was large and fleshy. This difference in the condition of the several muscles is quite in accordance with the clinical history, as the voice was affected long before the breathing became impaired."

Finally, I desire to express my thanks to Dr. Wyatt Wingrave and to Mr. Archer Ryland for their kind help in the arduous task of proof-correcting.

D. M.

PREFACE TO THE SECOND EDITION

So much of interest and of practical value has been added to our knowledge since the former edition of this work appeared in 1920 that it has been found necessary to enlarge the book by nearly one-third. On the other hand, a few unimportant items have been deleted.

I desire once again to express my most grateful thanks to the many colleagues and friends who have kindly allowed me to make use of their specimens, drawings and photographs, both in the first and in the present edition, and, to those already mentioned in my former preface, I wish now to add the names of Sir John Bland Sutton, Sir StClair Thomson, Mr. Arthur H. Cheate, Mr. E. D. D. Davis, Dr. H. K. Graham Hodgson, Dr. C. Thurstan Holland, Dr. John Inkster, Dr. R. P. Mathers, Mr. Archer Ryland, Dr. P. Watson-Williams, Mr. G. Russ Wood, and Mr. E. Musgrave Woodman.

A special word of thanks is offered to Dr. Georges Laurens, of Paris, for kindly permitting me to adapt to my own purposes several fine illustrations from his invaluable '*Chirurgie de l'Oreille*,' etc. (Second Edition. Masson et Cie, Paris, 1924.)

To Dr. W. B. McKelvie, of Manchester, I am indebted for the sketch from which is drawn the figure of a laryngeal cyst on p. 141, and to Miss H. M. Cunningham, through the kind offices of Dr. G. Scott Williamson, I owe the admirable coloured drawing on Plate II.

Most of the original new figures, like the old, are the work of Mr. S. A. Sewell, to whom I should like once more to express my gratitude.

D. M.

INTRODUCTION TO AMERICAN EDITION

Oto-laryngologists and general practitioners in this country have long felt the need of a comprehensive understanding of the British viewpoint on diseases of the nose, throat, and ear, and on allied subjects.

The introduction of McKenzie's text on *Diseases of the Throat, Nose, and Ear* into the United States now offers an excellent opportunity for those interested in this specialty to familiarize themselves with the British methods of examination, diagnosis, and treatment. It is gratifying to have available a text of this type written by so eminent an authority as McKenzie. With the true British instinct for detail, he has most comprehensively and fully described the methods and technic of examination of the patient, and consequently the major portion of this book is devoted to this phase of the subject. Herein lies one of its chief values, giving it a distinct advantage over many American texts. This feature will be especially appreciated by the general practitioner who frequently sees the patient before he consults the specialist.

Although pathology has not been considered in detail, the author has made sufficient reference to pathological findings to enable the reader to familiarize himself with the changes induced in the tissues by disease.

Only the most recognized and standardized methods of operative procedure have been described and recommended. Such procedures, however, have stood the acid test of application in the extensive clinical and private practice of the author.

It is refreshing to have a text of this type which condescends to mention the little things. Authors of medical textbooks and monographs often assume that the reader is familiar with minor and apparently unimportant details, but the student and general practitioner must be acquainted with them before the more complicated and important factors are clear and comprehensive.

One of the most noteworthy features of this book is that each section devoted to the symptomatology, diagnosis, and treatment of the various affections is preceded by an introductory chapter describing in detail the methods and technic of examination of the patient.

More than two hundred fifty illustrations and three colored plates scattered throughout the text most clearly exemplify certain important points, particularly in diagnosis and operative procedure.

It is a pleasure to write the introduction to the American edition of Dr. McKenzie's book and to urge American physicians to take advantage of the availability of this excellent text.

FRENCH K. HANSEL, M.D., M.S.

St. Louis, Mo.

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DISEASES OF THE THROAT, NOSE AND EAR

CHAPTER I

NOTE-TAKING AND GENERAL SEMEIOLOGY

Instruments.—No attempt will be made to give a detailed account of the many instruments used in the diagnosis of disease of these special regions, only those being mentioned in the text which the author himself has found most useful; and that for two reasons; first, because the simpler the student's armamentarium is, the less is he likely to be confused and troubled with a

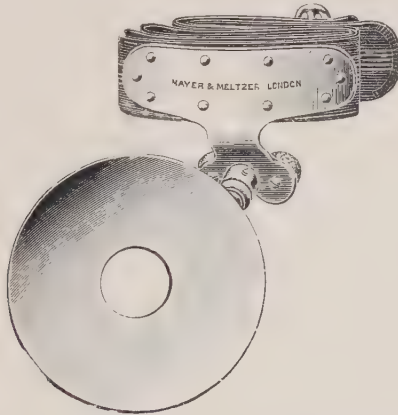


FIG. 1.—Jobson-Horne's Forehead Mirror.

multitude of unnecessary details; and secondly, because each workman must gather together his own bag of tools for himself.

Mirror.—Everyone has his own favourite mirror. The writer prefers one with a large eye-hole (Jobson-Horne's) as being infinitely the most comfortable to use for any length of time (Fig. 1). The focal distance should not exceed 7 inches. Dr. Perry Goldsmith, of Toronto, who has paid

particular attention to the curvature of the mirror, informs me that a curvature of 1.25 D. is the most convenient both for examining and for operating.

Lamp.—No one need hesitate to examine a throat or an ear for want of a special lamp, although it must be admitted that for operating in these regions, as well as for examination of the less accessible areas, specially powerful illumination is a desideratum, and indeed a necessity. Of these lamps, the Nernst is perhaps the most powerful, and, before the outbreak of the Great War, it was the light most commonly used in spite of its cost and fragility. A substitute, known as the "Half-Watt," is now being made

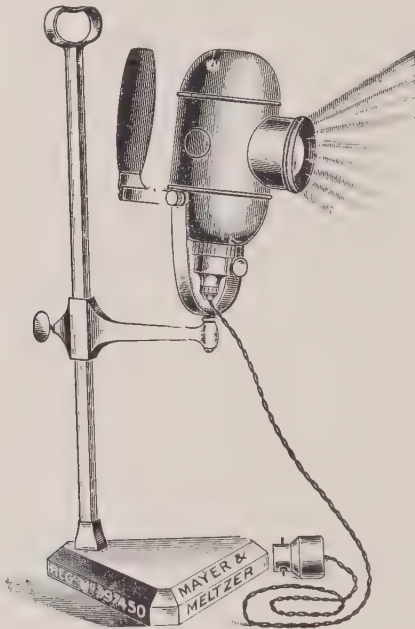


FIG. 2.—Mayer & Phelps' Examination Lamp.

in England, and I can recommend it as being almost as strong as the Nernst, and much more durable.

As a travelling lamp, one uses the electric headlight, supplied from an accumulator or from the main.

In an emergency, an ordinary paraffin or incandescent gas light serves the purpose quite well.

Small electric torches are useful for directly examining the pharynx, and the more powerful varieties may be used to supply illumination for a head-mirror.

The light for the mirror should be placed on a level with and just behind the patient's left ear, so that it shines full on the examiner's face as he sits opposite to his patient. If the examiner is unprovided with a mirror, the light should be held by an assistant, just behind and on a level with the former's right ear, and with the rays directed full on the patient's face.

The methods of illumination used in the various forms of endoscope will be dealt with later.

Considerable practice is required before one can manage the head-mirror and light with freedom and success, and this is specially true of operating. For that reason, the practitioner and student should attend the special hospitals and clinics as clinical assistant in order to become adept in the use of the mirror and head-light—an accomplishment which, it may be noted, is of the utmost value, not only to the specialist, but also to the general practitioner, and in the examination and treatment of regions other than the throat, nose and ear.

Asepsis in Examination.—In examining a patient, no less than in operating, measures should be taken and the habit formed to carry out with scrupulous care the ritual of aseptic surgery. All instruments brought into contact with the patient should be sterilized before and after use. In the inspection of the ear, for example, a speculum used for the one ear should not be used for the other without being sterilized.

Furthermore, when the surgeon has to make a digital examination, as in feeling for adenoids, or in palpating the buccal cavity or pharynx, his finger ought to be guarded by a sterilized rubber finger-stall or glove. A breach of this rule may have regrettable consequences.

Mask.—It is advisable always to wear a light mask of sterilized material when examining patients.

Note-taking.—A few remarks upon note-taking as practised at the Central London Throat and Ear Hospital will, first of all, be made.

Following the headings in the out-patient's letter, we find the first space to be filled up is that dealing with the patient's—

Complaint.—What is the most prominent subjective symptom? Endeavour to obtain from the patient a definite statement as to what ails him. Do not be satisfied with vague answers, like "Something in my nose," "My throat is bad," and the like. Do not accept ready-made diagnoses, such as "ulcerated throat," "polypus of the nose," etc., but ascertain what the patient actually feels amiss. It should be remembered that certain terms mean one thing to the doctor, and something else to the laity. Thus, when people say they have a "discharge from the ears," they may be referring to small pieces of cerumen which occasionally find their way out of the canal after washing. If a man is suffering from aural discharge, he will say he has a "running ear." In like manner, the examiner will often be surprised to find patients deny that they are "deaf," but quite ready to admit that they are "hard of hearing." In the case of aural discharge, be careful to discriminate between discharges which are watery ("thin," "colourless," "white") and those which are purulent ("thick," "yellow," or "matter").

Ascertain whether the *onset* of the illness has been *sudden* or *gradual*.

Certain diseases are characterized by a sudden onset: thus, sudden loss of voice, when occurring in a female patient, will often be found to be due to hysterical paralysis of the adductors of the cords, and the sudden occurrence of marked deafness, without pain, suggests cerumen as likely to be the cause. Acute or subacute disturbances in the nose, pharynx, larynx, ear, etc., are generally sudden in their onset; and, on the other hand, obstructive deafness from chronic catarrh of the middle ear, or from what is known as "otosclerosis," is of insidious and gradual onset. Occasionally, however, the onset may

appear sudden to a patient of moderate intelligence, inasmuch as a considerable degree of deafness in one ear may exist without his being aware of it, and it is only after the function of the unaffected ear has become impaired that the patient discovers his infirmity. Of gradual onset, we find hypertrophic rhinitis and chronic complaints generally. The hoarseness of simple chronic laryngitis and of tuberculous and syphilitic laryngitis is gradual in its development, the voice losing its finer qualities, and becoming rough and harsh in tone before it is finally lost.

It is, of course, of the greatest importance to ascertain whether an acute condition has supervened upon a chronic ailment, such as the occurrence of a recent attack of severe earache in a case of long-standing running ear, and it very frequently happens that this vital fact is only discovered by close questioning. (See p. 473.)

Duration of Complaint.—A definite statement should, if possible, be obtained, and for this, patience and some skill in cross-examination are required. Expressions like "some time," "some months," are naturally valueless. It is important to find out whether the ailment is continuous or intermittent ("on and off"). In intermittent complaints—*e.g.* in intermittent suppuration of the middle ear—patients always give the duration of the present attack only, and unless cross-examined, will lead the student astray, stating as duration of the illness weeks when it should be years.

Voice.—For slight alterations in the tone or quality of the voice one must accept the patient's word. In ordinary cases, dealing with people who are not in the habit of observing their bodily functions closely, considerable departure from the normal may exist without their being aware of it; but in the case of singers, actors, public speakers, etc., the observation of the patient regarding alterations in the *timbre* of his voice may be of considerable value. Ascertain which "register" is most affected, and whether the roughness or weakness affects the chest notes or the head voice. The examiner can observe for himself many abnormalities of the voice. Note, first, whether the voice is well produced, whether the sound is thrown well forward *ore rotundo*, or whether the speaker phonates with mouth half closed, or in an affected manner, throwing the voice up, as it were, into the naso-pharynx.

In addition to these errors in voice-production, accustom yourself to the definitely abnormal voice—*e.g.* a toneless, dead character in the speaking voice betokens obstruction in the naso-pharynx or nasal cavities. This is frequently miscalled the "nasal voice." The true nasal voice ("speaking through the nose") is heard in quite contrary conditions—in cleft or perforated palate, in enlargements and tumours of the tonsils and fauces, and in paralysis of the soft palate, in all of which the vocal vibrations are directed into the nasal cavity instead of through the mouth. Note, further, any interference with pronunciation—with labials, in paralysis affecting the orbicularis oris muscle; with dentals and linguals, as in the mumbling speech present when the tongue is tied down by adhesions or new growths to the floor of the mouth; with gutturals, like "ing," in nasal obstructions, etc. The presence of adenoids seems to predispose to abnormalities in the speech of children, and there is a particular irregularity known as the *nasal lisp*, in which the "s" sound is produced by the sides of the tongue or in the pharynx, and which is said to be always associated with them.

In addition to these commoner changes in the sound of the speaking voice

there is another much more rare, but so characteristic as to be unmistakable. It consists in the acquisition by the voice of a curious hollow tone—hence we may call it the *cavernous* voice—from the presence of some considerable obstruction at or about the base of the tongue, the epiglottis, the posterior pharyngeal wall, or elsewhere where it presents an obstacle to the emission of sound about the vestibule of the larynx.

The tones of the voice in patients who are very deaf are frequently flat in quality, and syllables and words are clipped in such a manner as to impart to the speech a curious staccato sound. This is probably due to the patient's inability to hear his own voice. The tones by means of which we impart depth and character to the voice, not being heard or appreciated by a deaf man, are not sought for by him to give to his speaking voice the colour proper to his mental attitude.

Hoarseness is a symptom of great importance, and should always lead to an examination of the larynx with the laryngoscope. There is no disease of the larynx from simple catarrh to cancer which may not cause hoarseness. But the converse is also true; there may be serious laryngeal disease without any change whatever in the voice. The reason for this is, of course, that hoarseness is due to impairment of the action of the vocal cords, and is only present when these structures or the muscles moving them are involved in disease.

The commoner varieties of hoarseness are, the coarse, rough voice of chronic laryngitis and pachydermia laryngis, varying in degree from the mere "port wine" voice up to one of a highly raucous quality; and the feeble voice of laryngeal tuberculosis, which, in the later stages, loses all trace of phonation, and becomes a mere harsh whisper. When all phonation has disappeared, we speak of the condition as *aphonia*. As already indicated, hoarseness (dysphonia) tends to result in complete aphonia. But aphonia may appear without any precursory hoarseness in functional or hysterical paralysis of the vocal cords, and also in simple acute catarrh.

Recurrent hoarseness in children is usually catarrhal and secondary to adenoids, but continued hoarseness in early life should raise suspicion of papilloma of the larynx.

In adults, continued hoarseness should lead to an examination of the larynx for tuberculosis and for cancer.

Cough.—The dependence of cough upon abnormal conditions of the upper respiratory tract should always be remembered. Note its frequency, and whether or not it is accompanied by expectoration. Ask the patient to cough, and observe its character, whether "rough," "croupy," or "brassy," as in laryngeal affections. Inquire into the nature of the expectoration—whether mucous, muco-purulent, purulent, blood-stained, etc. When a patient complains of "bringing up" blood or phlegm, ascertain whether the morbid material is "coughed up," "hawked up," or "thrown up." As a matter of fact, it is nearly always difficult and sometimes impossible to be sure, when a patient complains of "spitting blood," where it is coming from. Most frequently it is genuine hæmoptysis, and is proceeding from the thoracic organs, but true hæmoptysis may be very closely simulated by blood from the upper air-passages finding its way into the larynx and trachea. Thus it is met with after epistaxis and in cases of adenoids, as these growths are friable and bleed easily. Occasionally the blood comes from the mouth,

either from the gums, especially in pyorrhœa, or from a dilated capillary at the base of the tongue. In such cases a complaint that the blood comes into the mouth after eating, or after sucking sweets, may lead us to a correct diagnosis.

In all cases, however, the complaint of blood-spitting should lead to examination of the chest, even although bleeding spots in the mouth or upper air-passages have been found.

Almost any disorder of the throat, nose or ear may induce cough, and the cough arising therefrom is usually "dry"—*i. e.* unattended by expectoration. Of this nature is the cough due to the irritation produced by cerumen or foreign bodies in the external auditory meatus; the cough due to elongated uvula, which is usually most troublesome when the patient is recumbent; the cough arising from such intranasal conditions as polypi, etc. This cough is often described as "hacking," and is one variety of the old-fashioned "stomach cough." Cough set up by these conditions is usually paroxysmal, and may be very severe; so severe, indeed, are the paroxysms at times that they culminate in vomiting, and so may simulate whooping-cough. Not seldom the cough is the sole symptom for which the patient seeks relief, and it is then our task to discover, if we can, the source and origin of the attacks. In addition to the causes already mentioned, search should be made for "cough-spots" in the nose. They occur at the "tubercle" of the septum, and at the posterior and anterior ends of the inferior turbinal body (in order of frequency). Another common site of origin lies in the "trigger area" of swallowing at the base of the tongue. (See also later, p. 18.)

In hysterical aphonia the complete absence of sound during efforts at speaking is often associated with a perfect cough, in which the observer may detect phonation.

Respiration.—The patient should be asked to breathe through the nose. As a method of ascertaining the degree of patency of the nasal cavities, Wingrave's Spirograph test is both simple and satisfactory. It consists in making the patient breathe out through the nose upon a polished surface, such as a thin slab of polished wood or vulcanite, preferably of a dark colour, held horizontally just below the nostrils. The condensation of moisture forms a cloud on the polished surface, and as this evaporates, the portion corresponding to the obstructed nostril disappears before that corresponding to the open side. By a constant use of this test, it is possible to form a rough standard by which one can determine the degree of obstruction present in one or the other or both sides.

Nasal Obstruction is a frequent complaint. Ascertain whether it is permanent or variable. The former is found with nasal polypi, new growths, deviations of the septum, adenoids, and such diseases or injuries as induce permanent swelling of the nasal mucosa.

Variable obstruction is generally due to turbinal engorgement, which typically comes and goes at irregular intervals. As a rule, a change in the temperature of the air, whether from hot to cold or *vice versâ*, is sufficient to bring about a change in the nose, either for better or for worse. Patients often complain of *alternate obstruction*, one side being patent while the other is closed. This is particularly remarked on lying down, the blocked side corresponding with the side the patient is lying on.

Nasal obstruction gives rise to many serious secondary effects, such as

Eustachian obstruction, catarrh of the middle ear, chronic pharyngitis and laryngitis, and even chronic bronchitis and asthma.

Such conditions are most frequently seen when the nasal obstruction is itself secondary to serious local infections, such as sinus suppuration, but the milder forms of nasal and sinus catarrh are also apt to induce them. It is generally believed that even the milder forms of nasal catarrh are due to microbic infection, and that these aural, laryngeal and bronchial phenomena are due to extension of infection. It must not be forgotten, however, that simple anatomical abnormalities, such as deflections of the nasal system, may be the starting-point of persistent changes, proximate as well as remote, of an infective character.

Ascertain if the patient is a *mouth-breather*. Does he snore when asleep? **Snoring should be always regarded as a symptom of disease.** In children, snoring generally means adenoids with or without enlarged tonsils; in adults, the symptom is usually due to elongation and engorgement of the uvula and paresis of the soft palate. People with marked nasal obstruction, also, generally snore when asleep. Frequently no information can be obtained regarding a patient's breathing during sleep, but the complaint of "dry throat and mouth in the morning" may be looked upon as an indication that the patient is a nocturnal mouth-breather. Healthy, normally constituted people are unable to sleep while breathing solely through the mouth, but the ability to do so is easily acquired, especially when the obstruction to the normal passage of air through the nostrils is of slow development. New-born infants always breathe through the nose during quiet respiration, and never through the mouth, unless when crying. As a consequence, nasal obstruction of sudden onset at this period may directly menace life, not only from the interference with suckling, but also from the circumstance that the baby begins to cry, and keeps on crying as long as it breathes through the mouth, so that rest and sleep are unattainable, and the child, if unrelieved, may die of exhaustion.

Stridor.—Interference with the current of air, from disease or a foreign body, as it passes through the larynx or trachea may set up stridor—an unmistakable sound to those who have once heard it. When produced in the larynx, stridor accompanies inspiration; when proceeding from the trachea, it accompanies both inspiration and expiration. In the latter case we may suspect the cause to be aneurysm, goitre, or tertiary syphilis affecting the tracheal wall. The obstruction to the breathing may be so great as to cause dyspnoea on exertion, during which the stridor becomes louder, as it does in a "roaring" horse. Remember the occasional occurrence of *congenital stridor* in new-born infants. (See p. 107.)

Diseases of the nose and naso-pharynx are frequently associated with paroxysmal asthma and bronchitis; while asthma-like dyspnoea along with a bronchitic wheeze may denote the presence of a foreign body in the bronchi.

Attacks of Dyspnoea with Stridor.—Choking sensations or attacks arise from a multiplicity of causes. They vary in severity, from a mere transient feeling of suffocation to actual asphyxia, ending in unconsciousness, and perhaps death. The causes giving rise to this symptom may be tabulated as follows:

1. *Slight choking sensations*, usually reflex, occur in—
 - (a) Enlargement of the lingual tonsil.

- (b) Paræsthesia of the pharynx or larynx (globus hystericus).
- (c) Anæsthesia of pharynx or larynx.
- (d) Goitre, simple and exophthalmic.

2. *Severe attacks of asphyxia* from physical obstruction to the passage of air through the pharynx, larynx or trachea may arise from—

- (a) Foreign bodies in the pharynx, larynx or trachea.
- (b) Membranous laryngitis.
- (c) Simple, œdematous, tubercular or syphilitic laryngitis.
- (d) Pharyngeal or laryngeal neoplasms.
- (e) Bilateral paralysis of the abductors of the vocal cords from pressure on both recurrent laryngeal nerves, by tumours, goitre, aneurysm, etc.
- (f) Spasm of glottis.
- (g) Direct pressure on larynx, trachea or large bronchi, by tumours, goitre, aneurysms, etc.

Deglutition.—Ascertain in cases where difficulty or pain is experienced on swallowing, whether trouble arises on swallowing liquids or solids. It is a good plan to make the patient swallow in your presence, giving him water to drink or some food to eat, according to his complaint. *Dysphagia* may arise from pain, from paralysis, or from some mechanical interference with deglutition. A raw, scraping soreness on swallowing characterizes the several forms of pharyngitis, and in this case, as a rule, it is less painful to swallow food than saliva. Severe pain is a frequent and distressing accompaniment of tubercular ulceration of the larynx if the epiglottis or other parts about the entrance to the larynx have become involved in the disease. Interference with deglutition from inflammatory conditions reaches its maximum in peritonsillitis or quinsy, when swallowing may become quite impossible, so that the saliva dribbles from the half-open mouth. In this instance the dysphagia is due partly to pain and partly to physical interference with the action of the pharyngeal muscles by the intense and massive inflammatory swelling. In paralysis of the soft palate (usually diphtheritic) imperfect deglutition may lead to a regurgitation of fluids through the nose, and the same disability is experienced in perforations of the palate, congenital or acquired.

Inability on the part of young infants to fasten to the mother's nipple is generally due to nasal obstruction from adenoids; but in older children also difficulty in swallowing should lead to an examination for these growths.

Obstruction to swallowing, more or less complete, occurs in stenosis of the œsophagus, malignant or simple, and in these cases likewise a regurgitation of food may occur, usually a very short time after it has been swallowed. A similar occurrence takes place when there is a pharyngeal pouch. (See p. 23.)

Pain.—The occurrence of pain is to be noted. Mark its situation, its severity, whether it is increased or relieved by pressure over the painful area, and by what muscular movements it is evoked or intensified. The pain of sore throat should be discussed, whether it is constant or felt only on swallowing. Diphtheria affecting the throat is often painless, and the same is true of the tertiary syphilitic ulcerations. In peritonsillitis the pain is constant, violent and unilateral, shooting up towards the ear of the affected side. Normally, indeed, tonsillar sensation is referred to the Eustachian tube.

In nasal sinus affections—often when acute, but seldom when chronic—pain, sometimes very severe, is complained of in the frontal region, the root of the nose and orbit, or the cheek, according to the sinus affected, in typical cases. The situation of the pain in sinus inflammations is, however, by no means constant; thus, pain in the forehead or root of the nose is frequently due to disease of the maxillary antrum, and Abercrombie has reported a case of unilateral frontal sinusitis in which the pain was referred to the supra-orbital ridge of the healthy side. In chronic sinusitis the site of the pain is less well defined than in acute sinusitis; pain, indeed, apart from headache is usually altogether absent. When it is present it is often made worse by blowing the nose, coughing, sneezing, lowering the head, and the like.

With or without definitely localized pain, sinus suppuration is a frequent cause of severe *headache*, at times associated with drowsiness, vertigo, and mental confusion, almost amounting to loss of consciousness. The headache of maxillary antrum and frontal sinus suppuration is usually referred to the forehead; that of sphenoidal sinus suppuration to an area on the skull half-way between the external auditory meatus and the external occipital protuberance.

One must also remember that “neuralgia,” ascribed to carious teeth or to neuritis of some branch of the trigeminal, may arise reflexly from the nose, either from sinus disease, or, what is perhaps more frequent, from the long-continued pressure-irritation of some bony septal spur or enlarged turbinal.

Headache may be the first symptom in meningitis arising in the course of aural or nasal disease; it is usually associated with stiffness in the muscles of the nape of the neck.

Laryngeal disease is painless so long as it is confined within the larynx, but when once the boundaries are crossed, the pain set up may be very severe. This is particularly true of cancer and tubercle, whether the extension made is into the pharynx or into the cartilaginous framework whereby perichondritis is induced.

There is one exception to the general mildness of laryngeal sensation, and that occurs in the familiar laryngitis of an “acute cold,” the cough of which is often very painful, the pain being referred to the middle of the sternum.

Freedom from pain also characterizes œsophageal affections so long as they are confined to the œsophagus.

Turning to the ear, we find that most of the acute affections are painful; furuncle of the external auditory meatus, acute catarrh, acute suppuration of the middle ear and acute mastoiditis are all marked by severe pain, in children at all events. But in adults it is remarkable that severe inflammation of the middle ear may excite no pain whatever, and all that the patient notices is some deafness followed by the onset of discharge.

The deep-seated boring pain known as “earache” is generally due to inflammatory diseases of the middle ear. Its occurrence in sufferers from chronic ear discharge is of great importance, inasmuch as it may foreshadow or indicate an extension of the disease to the mastoid cells or to the cranial cavity. In typical cases it is worse at night.

The chronic diseases of the middle ear are usually painless, although occasional twinges are sometimes complained of.

In general, it may be stated that pain in the ear is a danger-signal; but,

on the other hand, it must be remembered that dangerous diseases of the ear may exist without causing any pain.

Tenderness on pressure over the mastoid is a sign of great importance as an indication of mastoid disease. (See later, p. 506.)

Pain in the neck should lead to careful examination of that part. Palpate the glands at the angle of the jaw, noting whether they are enlarged or tender. Pain and swelling, with oedema of the skin, in any part of the neck should arouse suspicions of abscess under the middle or deep layers of the deep cervical fascia.

Taste and Smell may conveniently be taken together, as disturbances of one are generally associated with disturbances of the other. These disturbances are classified thus: *hyperosmia*—excessive sensibility of the olfactory organ; *hyposmia*—diminished sense of smell; and *anosmia*—absence of the olfactory sense. In like manner, the terms *hypergeusia*, *hypogeusia* and *ageusia* apply to corresponding disorders of the sense of taste. A deficiency in taste is generally combined with a deficiency of smell, and that in turn is most frequently caused by some form of nasal obstruction, the removal of which will restore both functions. In cases where no sign of nasal obstruction exists, we proceed to test the olfactory and gustatory senses chemically. In testing smell, avoid the use of pungent substances, like ammonia, which stimulate the nasal terminations of the fifth cranial nerve. Essential oils, such as cloves, or odoriferous substances like musk or camphor are suitable. In testing taste, direct the patient to put out the tongue and close the eyes. After drying the tongue, apply to its surface, on a glass rod, a bitter (solution of quinine), sweet (sugar or saccharine), acid (dilute acetic acid), and saline (solution of common salt).

The sense of flavour is olfactory.

Cacosmia (a bad smell) is a frequent complaint. Enquire whether it is noticed by the patient (subjective cacosmia) or by others (objective cacosmia). It may, of course, be both subjective and objective, as in the cacosmia of nasal sinusitis, of a foreign body, or of necrosed bone in the nose. Objective cacosmia, of which the patient is unaware, is characteristic of *ozæna*. It is also present in such throat affections as diphtheria and Vincent's angina, while in the later stages of cancer of the throat and mouth it becomes to bystanders almost unendurable.

Sometimes we fail to discover any cause for subjective cacosmia, and the same unsatisfactory conclusion must be arrived at in many, perhaps in most cases where the complaint is that of a "bad taste." We do not, of course, adopt a negative attitude until we have exhaustively investigated all these regions, not forgetting the mouth and the teeth. A bad taste, curiously enough, is occasionally complained of in chronic suppuration of the middle ear, and that disease may also give rise to subjective cacosmia.

(The discussion of *deafness* and other auditory phenomena will be found at p. 406.)

The **Physiognomy** or **Facies** of the patient may at once guide us to the seat of the disease. One should accustom oneself to the facies presented in the various diseases of the regions under consideration. There are, for instance, the open-mouth, vacant expression, buck teeth, and toneless voice of the child with adenoids; the strained, listening expression, inclination of the better ear, toneless and clipped syllables of chronic deafness; the dribbling

mouth, stiff carriage of the head, facial expression of pain and anxiety, together with the nasal phonation and the difficulty in opening the mouth, seen in quinsy.

The facies of throat cancer in the advanced stages is also characteristic with its open mouth, haggard and pallid face, foetid breath and obvious emaciation.

In adults one associates broadening of the bridge of the nose with ethmoidal disease and nasal polypi, and sinking of the bridge of the nose with tertiary syphilis of the septal bones, while in ozæna we frequently see a wide, flat nose with open nostrils. In this disease also, a profile view of the patient will usually show that there is a little dimple on the bridge of the nose, in the middle line, just below the lower edge of the nasal bones, probably due to thinning and weakening of the septal cartilage, as the same slight deformity is produced when too much of the cartilage has been removed in the operation of submucous resection of the nasal septum.

Persons who have been subjects of hereditary syphilis bear the records of their past history in the radiating scars at the angles of the mouth, in the notched incisor teeth, and, it may be, in interstitial keratitis.

Again, the association of chronic deafness in an adult, with scanty hair, a dry skin, a fresh-coloured complexion, and a general appearance of stoutness, brings myxœdema to the mind.

The protrusion of one auricle in a patient who has suffered from discharge from the ear would suggest the likelihood of a mastoid or temporal abscess. (Fig. 215.)

Before bringing a speculum near the nose or ear, carefully inspect the patient on one side of his head and on the other, full face and from behind. (The last enables us to judge most surely of deformities or displacements of the auricle.)

General Examination.—The diseases and abnormalities in the throat, nose and ear have a close connection with the patient's general health and constitution. Not only do these diseases lead on to general ill-health, but they may be in themselves the result of some general disorder. We have already made mention of myxœdema as a cause of deafness, but we must also remember that nerve-deafness may be one phenomenon of a general nervous disease, and that suppuration of the ear may induce brain disease. In like manner the close association of nasal abnormality or disease with complaints like asthma, neuralgia, headache, epiphora, optic neuritis and other diseases of the eye; of pharyngeal disorders with the infectious fevers, pneumonia, herpes, and diabetes; of laryngeal affections with pulmonary tuberculosis, thoracic aneurysm and other chest diseases should never be forgotten.

Consequently it may be laid down as a clinical rule that an examination of the throat, nose and ear and adjoining regions is incomplete until a general survey of the patient has been made.

Colds.—The liability of sufferers from throat, nose and ear diseases to "colds" should be investigated closely, for under this term people include all manner of troubles connected with the ears and upper respiratory tract.

Most people, perhaps, are accustomed to a "cold" about every six months, usually in the spring and autumn, and they are not likely to complain of such "seasonal catarrhs." As these visitations are almost certainly epidemic

and infectious in character, it is not advisable to refer them to any disease or abnormality in the upper air-passages.

But the case has a different complexion when "colds" occur more frequently than twice a year, and we ought then to look for some special cause for their continuing recurrence. This may be found in the presence of adenoids, of nasal sinus suppuration, of nasal polypi, of paroxysmal rhinorrhœa, and so forth, the successful treatment of which will abolish the tendency. While that is the rule, we must also remember, however, that a tendency to frequent "colds" may occasionally exist without any discoverable abnormality in these regions. (See p. 272.)

Infective Foci in the Throat, Nose and Ear.—At this point we may make some reference to the examination of these special regions when a search is being made for a focus of infection which is giving rise to general sepsis, or to septic disturbances elsewhere in the body.

For convenience we shall distinguish two classes of case—the acute and the chronic.

In the *acute* there is pyrexia, which may or may not be accompanied by such local phenomena as arthritis (rheumatic or pyæmic), osteomyelitis of the long bones, pyelitis, bronchitis, broncho-pneumonia, endocarditis and the like.

In these cases particular attention is paid to the tonsils, to the nasal accessory sinuses, and to the middle ear.

With regard to the first, the presence of inflamed tonsils or the history of recent attacks of tonsillitis is of importance. But when the tonsils are, and have been normal in their behaviour, it may be concluded that they are not responsible.

The examination of the nose must be thorough (see p. 231). As a rule, when a nasal sinus is suppurating there is some history of nasal or post-nasal discharge, and inspection will reveal some swelling and, it may be, pus in the neighbourhood of the sinus orifices. But not invariably. That being so, the maxillary antra, the sphenoidal sinuses, and, if possible, the ethmoidal cells should be punctured and washed out as a routine measure. Moreover, an X-ray photograph by a radiologist skilled in nasal sinus work should always be obtained.

Only when these findings are negative can we venture to exclude the nasal sinuses. And even then, indeed, the ease with which some suppurating sinus can be overlooked must always render a negative opinion not altogether conclusive. (See also p. 342.)

Turning to the ears, we have to remember that, while in most cases purulent otitis media can be readily discovered, even when the membrana tympani is intact, yet there are cases in which serious general infection is caused by aural sepsis which only the most careful examination can detect. Not only may there be no discharge and little or no pain, but the membrane may show but a trifling departure from the normal, and yet the septicæmia may be otogenic. (See p. 481.)

Acute rheumatism and osteomyelitis are frequently due to acute tonsil infections; and pyelitis in children, even when referred to the *B. coli communis*, may sometimes be cured by removing septic foci in the tonsils, the ears, or the teeth. The same is true of septic endocarditis.

In children, bronchitis and broncho-pneumonia may be set up by adenoids

or by nasal sinusitis. At all ages, indeed, nasal sinusitis, more particularly maxillary antrum suppuration, may induce lung disorders closely resembling phthisis pulmonalis.

Further, bronchitis and broncho-pneumonia are occasionally caused by an unsuspected foreign body in the bronchial tree.

Of *chronic* diseases, rheumatoid arthritis, nephritis and cervical adenitis (simple or tubercular) can sometimes be cured by the removal of tonsils that show little or no hypertrophy.

Again, we have the important group of eye-disorders, such as retro-bulbar neuritis, due in some cases to nasal sinusitis again, while choroiditis and irido-cyclitis may be caused by septic absorption either from the sinuses or from the tonsils.

Dermatologists, also, are at times inclined to refer certain skin diseases to foci in these regions, but on this point opinion is still unsettled.

CHAPTER II

EXAMINATION OF THE BUCCAL CAVITY, FAUCES, AND PHARYNX

PHYSICAL EXAMINATION

The Lips, etc.—Note the shape of the mouth when the patient is quiet, and when he is smiling or talking—whether, *e.g.*, it is drawn to one side, as in facial paralysis. Next observe the lips, noting whether while the patient is at rest they are closed or open. Note also their colour—red, cyanotic, or pale. Frequently, nasal and pharyngeal catarrhs are accompanied by dry, peeling, or cracked and sore lips. Note also the presence of skin eruptions—herpes, eczema, etc.—on the lips, and of scars at the angles of the mouth.

Having inspected the lips, ask the patient to open the mouth.

Difficulty or pain in doing so is found in—

1. Acute peritonsillitis;
2. Acute external otitis (especially furuncle);
3. Tonic spasm, from (a) tetanus, (b) strychnine poisoning, (c) reflex spasm from unerupted wisdom teeth or from dental caries;
4. Synovitis or arthritis of the temporo-maxillary articulation;
5. Ankylosis of the temporo-mandibular articulation;
6. Adhesions—*e.g.* following cancerum oris; gunshot and other war injuries;
7. Cancer of tongue, tonsil, pharynx.
8. Parotitis—epidemic, septic, etc.
9. Otitic pterygoid abscess (rare).

The mouth open, inspect the inner surfaces of the lips, where mucous patches of the secondary stage of syphilis occasionally appear. On this surface are to be found in the pre-eruptive stage of measles the so-called Koplik's spots. These resemble minute sago grains on a red ground sprinkled over the mucous membrane, to which they impart a granular appearance. They are most easily demonstrated when the light, which must be daylight, falls on the surface at a slant.

Having inspected the inner aspect of both lips, together with gingivolabial recesses, transfer the attention to the state of the teeth, artificial dentures being removed if present. Look for the stunted, peg-shaped central upper incisors, with the notch in the free edge, indicative of hereditary syphilis—the “Hutchinsonian teeth.” Examine carefully, under the reflected illumination of your forehead mirror, for signs of dental caries. To ensure

accuracy, a careful inspection by means of a small laryngeal mirror in the inner and posterior aspects of the teeth is advisable. Carious teeth and pyorrhœa alveolaris are frequently responsible for the septic conditions of the buccal and pharyngeal structure, and carious disease of the upper molars is often found in conjunction with suppuration in the maxillary antrum. (See p. 338.)

The **Gums** must also be inspected. In addition to such alterations in colour as lividity or pallor, the gums may exhibit changes due to general diseases like scurvy and purpura, mercurial salivation, lead-poisoning, etc. Make a note of pyorrhœa alveolaris if it exists. The mucous membrane of the gums and cheeks is generally reddened in catarrhal colds, and a circumscribed patch of erythema may arise from the irritation of a jagged tooth, or from the existence of alveolar abscess. In mumps, the opening of Stenson's duct, opposite the second upper molar, assumes the appearance of a red papilla pouting from the surface of the cheek. The white curdy flakes of thrush are frequent on the mucous surfaces of the cheek in infancy, and towards the close of exhausting diseases in adults.

Next direct your light upon the **tongue**. Note its size and movements. Can it be fully protruded? Hindrances to protrusion may be due to (1) abnormal shortness of the frænum ("tongue-tie"); (2) ulceration of the frænum; (3) (in the substance of the organ) gummatous infiltration; (4) cicatricial contraction; or (5) cancerous disease, etc. The tongue is protruded towards the paralysed side in hemiplegia. Everyone is familiar with the jerky protrusion and snappy withdrawal of the tongue in chorea. Fine muscular tremors, as in alcoholism and other toxic states, and in certain nervous diseases, such as exophthalmic goitre, etc., are plainly seen in the tongue. Note the condition of the dorsum of the tongue, with its three varieties of papillæ—the fungiform, as tiny red points; the filiform, most numerous towards the tip; and the eight or ten circumvallate papillæ, arranged like the letter **V** diverging from the foramen cæcum, towards the back of the organ. These last are occasionally looked upon by patients as evidences of disease or as growths. Notice whether the dorsum is *furred*, and, if so, whether the furring is general or limited to one side or part. Localized or unilateral furring is usually due to carious teeth. One ought to be able to recognize the "strawberry" and the later "raspberry" tongue of scarlet fever; the large, pale, tooth-indented tongue of chronic dyspepsia and alcoholism; the "irritable" tongue, with its red islet on the dorsum from excessive tobacco-smoking; the "fissured" tongue; the "geographical" tongue; the "tertiary" tongue, with its areas of leukoplakia (see p. 637), etc. Valuable information may often be obtained from a careful investigation of scars on the tongue.

Examine next, in rotation, (1) the hard palate, (2) the soft palate, passing on to (3) the uvula, (4) the anterior and posterior pillars of the fauces, (5) the tonsillar region, and (6) the posterior wall of the pharynx.

The Palate.—Making the patient tilt his head right back, note the shape of the vault of the palate—whether, *e.g.*, it is highly arched and narrow, as in a neglected case of adenoids, in which case the teeth will probably be found to be irregular and prominent. In infants, and in edentulous people after absorption of the alveolar processes, the palate is flat. The palate may be perforated, cleft, or absent.

Notice next the movements of the soft palate and uvula. The first introduction of the tongue-depressor is, in most cases, sufficient to induce an instinctive elevation of the soft palate and uvula; but when paralysed, as in diphtheritic paralysis, the soft palate hangs motionless and irresponsive to stimuli, remaining stationary during deep inspiration, phonation and deglutition. In unilateral paralysis the uvula is drawn towards the sound side.

Observe the colour of the palate, fauces, uvula and pharynx. Pallor of these regions is observable in anæmic conditions, and in phthisis. If there is congestion, note its intensity and its distribution—whether general, or limited to certain regions, as, *e.g.*, the tonsils. General hyperæmia is seen in alcoholism, excessive tobacco-smoking, gouty conditions and in simple catarrh. The congested pharynx of measles is associated with the appearance of the rash on the soft and hard palate as punctate areas of redness, with lines radiating from them in a stellate manner. In scarlet fever the hyperæmia is intense, general, bright and uniform. The scarlet throat in severe cases looks glazed and dry, and is spotted with stringy flakes of mucus adhering to the posterior pharyngeal wall. A hyperæmia limited to the soft palate or to the pillars of the fauces and the tonsils, showing the so-called “snail-tracks,” raises the question of secondary syphilis, but it may be added here that in certain cases with simple tonsil hypertrophy, an appearance is obtained resembling the typical “snail-track” of the secondary throat.

Herpes is sometimes seen on the palate and pharynx. It should always be looked for in facial paralysis.

Uvula.—The uvula participates in all general inflammations of the pharynx. In very acute conditions it tends to become œdematous and translucent; in long-continued inflammations it may undergo hypertrophy and elongation. The uvula may be bifid or congenitally absent. Absence may also have been brought about by tertiary syphilitic ulceration, and by the surgeon in the operation of enucleation of the tonsils.

Examine the **Tonsillar Region**, depressing the arched tongue by means of a tongue-depressor. Fränkel's is the most useful all-round tongue-depressor (Fig. 3); but larger tongue-depressors, such as Seymour Jones's, are often necessary to control the involuntary movements of the organ, especially in nervous patients, and for children there is no tongue-depressor like the handle of a teaspoon.

Having warmed and gently introduced the sterilized tongue-depressor between the lips, ask the patient to phonate, saying “Ah-h-h,” and while he is doing so, slip the depressor on to the dorsum of the tongue. A practical hint of importance is necessary here. Do not insert the tongue-depressor further than the foramen cæcum, otherwise a small sensory twig of the superior laryngeal nerve ramifying over the mucous membrane of the base of the tongue will be stimulated, and gagging and retching will ensue. Neither is it wise to be too timid, for if the depressor is placed on the tongue too near the point, a proper control of the organ will not be obtained. There is an exact spot just in front of the foramen cæcum on which the tip of the depressor should rest.

Having obtained a proper control of the tongue, direct your light first on one tonsil and then on the other. Note the size and shape of the tonsils. Do they seem larger than usual? In order to scrutinize each tonsil in turn,

move the patient's head first to the left, and hold back the right corner of the mouth, and then to the right, holding back the left corner of the mouth. In this way a more direct view of the tonsils can be obtained than by looking straight into the mouth.

Observe in every case the condition of the little cleft in the antero-superior aspect of the tonsil, known as the supratonsillar cleft or fossa, the opening of which is often occluded by a small fold of mucous membrane. This fossa or cavity is often occupied by cheesy plugs, composed of epithelium, mucus, leucocytes, lime-salts and bacteria, which may form the starting-point of inflammatory troubles.

Finally, examine carefully the posterior pharyngeal walls, observing the condition of the surface—whether dry and glazed, granular, or, it may be, ulcerated.

Muco-pus clinging to the posterior wall of the pharynx is indicative of nasal suppuration, and should be carefully noted.

When the pharynx of a patient lying on his back *in bed* is to be inspected the electric lamp is laid on the pillow beside the patient's left ear while the surgeon, wearing his forehead mirror, sits on the bed at the patient's right side and leans over him. The ability to make an examination of a patient lying in bed should be carefully acquired. It is, as a matter of fact, by no means difficult to do so, and not only the pharynx but the larynx also can be satisfactorily inspected if attention be paid to the directions given.

If the patient sits up in bed and turns his face towards the surgeon the rotation of the head renders the transverse process of the axis prominent in the side of the pharynx towards which the face is turned. Do not mistake the prominence of this region in that attitude for retropharyngeal abscess or an enlarged tonsil (Douglas Guthrie).

For examination of the laryngo-pharynx, see p. 105, and of the naso-pharynx, see p. 236.

Inspection of the Throat in Children.—This is always a difficult proceeding in a child with a tempestuous individuality, but by attention to the following instructions the performance will be robbed of its terrors alike for the mother and the doctor.

Seat the child in the mother's or the nurse's lap, not sideways, as is the natural mode, but with the back of the child against the chest of the nurse, so that it faces the doctor sitting in front. The nurse then separates her knees slightly, and as the child's legs slip in between them she clenches them together again. That prevents kicking, and preserves the integrity of the

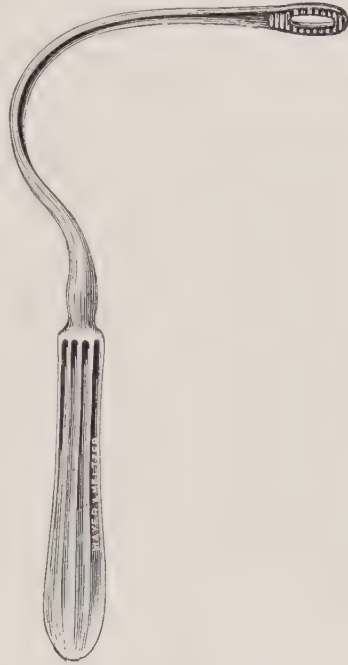


FIG. 3.—Fränkel's Tongue-Depressor.

doctor's shins. Next, instruct the nurse to pass her right arm and hand—or, if the little patient is muscular and violent, both arms—round the child's chest outside his arms, gripping his hands while doing so. The patient is now held tight in a living vice, all save his head. To prevent it being shaken about, ask the nurse to put her spare hand, if she has one, round the forehead of the child, and to hold back the head firmly on her chest. If the nurse has no hand to spare, then the doctor can control the head with his left hand on the forehead, while he manipulates the teaspoon or other tongue-depressor with his right.

Driven thus to his last defences, the boy now clenches his teeth, breathes defiance through his nose, and awaits events. They need not detain him long. Pinch his nostrils together, so as to stop nasal breathing, and as he opens his mouth to gasp in some air, slip the tongue-depressor in over his tongue, and the game is up.

Some children can breathe through the mouth with the teeth clenched. In that case, pass your forefinger between the cheek and the teeth and back to the gums behind the last molar. Insinuate the point of the finger between the jaws at this spot, and the mouth will open.

Once the mouth is open, it can be kept open indefinitely by pushing the lower lip over the lower incisors, so that if the child attempts to close his mouth, he will bite his own lip. This little manoeuvre may, however, lead to a wound and some blood flowing, consequently it should not be adopted save as a last resource. In nearly all cases the mouth can be kept open by the depressor on the tongue, or, if necessary, by pushing back the depressor so as to tickle the fauces and induce gagging. This has the added advantage of bringing the tonsils fully into view.

The Base of the Tongue.—For a satisfactory examination of this region, which lies beyond the circumvallate papillæ and the foramen cæcum, the laryngeal mirror is required (see p. 92). The tongue here is attached laterally to the anterior pillars of the fauces and posteriorly to the epiglottis by the central glosso-epiglottic ligament—the frænum of the epiglottis—on either side of which are the vallecule, or right and left glosso-epiglottic fossæ, which in turn are flanked by the right and left glosso-epiglottic ligaments. This area is supplied by branches of the right and left superior laryngeal nerves, the sensory nerves of the larynx, and it is so extremely sensitive that it has been named the “trigger-area” of the swallowing reflex—an appellation which bears its own significance. When the mouth is closed, touching this area sets in operation the involuntary part of the mechanism of deglutition; when the mouth is wide open, the same stimulus induces the act of retching, that being the terminal act of vomiting, which is, of course, the reverse movement to deglutition. Consequently, in anæsthetizing the throat for examination or operation, the anæsthetic should be applied to this area first. Here the **Lingual Tonsil** is found. It appears normally as a number of gentle elevations on the surface of the tongue; but, like adenoid tissue elsewhere, it is subject to hypertrophy.

LOCAL ANÆSTHESIA

There is, perhaps, no other department of medical practice in which local anæsthesia is so frequently and widely employed as in oto-laryngology.

And of all local anæsthetics none is so reliable and powerful as **Cocaine**, so that in spite of its toxic properties, it still remains the local anæsthetic of everyday use.

The dose of cocaine hydrochloride by the mouth is officially set down to be gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$, which is equivalent to from m^{ii} to m^{v} of a 10 per cent. solution of the drug. But this quantity is habitually exceeded in making local applications to the mucous surfaces of the pharynx, larynx and nose.

Moreover, the phenomena of *cocaine poisoning* may be excited by quite small quantities of the drug in susceptible subjects. Consequently, the laryngologist must always be on the alert for toxic symptoms, so that he may intervene to check their full development as soon as they make their appearance.

The *symptoms* of acute cocaine poisoning are: a feeling of faintness with tingling and numbness of the extremities, associated with pallor of the face and lips; clammy perspiration; a rapid, compressible and sometimes fluttering pulse; sighing respiration; and dilated and fixed pupils. These asthenic phenomena may set in suddenly and progress rapidly, to end in unconsciousness and sometimes even in death. Convulsions are occasionally observed, and may appear early. Their occurrence is ominous.

Prevention.—Difficulty of controlling the absorption of cocaine renders it unwise to use the drug hypodermically. When, therefore, anæsthesia by infiltration is called for, as for example in tracheotomy, one of its substitutes, such as eucaine or novocaine, should be employed.

When used as a local application for the induction of surface anæsthesia, cocaine should always be freshly combined with *adrenalin*, the ordinary strength for pharyngeal and laryngeal mucous surfaces being 10 per cent. sol. cocain. hydrochlor. with an equal quantity of sol. adrenalin (1-1000). This combination is both safer and more effective than cocaine alone, and that for two reasons. First of all, adrenalin by its vaso-constrictive action not only restricts the absorption of cocaine into the general circulation, but, by denuding the local nerve-endings of blood, freely exposes them to the action of the cocaine and thus intensifies its local effects. For this reason, less cocaine may be used. Secondly, adrenalin absorbed into the blood acts in the system as a physiological antidote to cocaine.

In making applications of the anæsthetic solution to the pharynx and larynx it is advisable to apply the mixture in a cotton-wool swab to the area to be anæsthetized very precisely, and the patient should be instructed not to swallow, but to spit out any excess of liquid that may escape.

Emotional syncope, favouring and increasing, as it does, the constitutional effects of cocaine, should be countered by keeping the patient recumbent when that is possible, and this injunction applies with particular force to operations under cocaine anæsthesia.

In simple emotional syncope, by the way, the pulse is slow and feeble; in cocaine poisoning it is rapid and feeble.

Avoid cocaine in debilitated patients, as it is then apt to give rise to shock from which they may not recover.

By attention to these rules the risk of cocaine intoxication is reduced to a minimum, even when large amounts of the drug are used. (See p. 240.)

Treatment.—As soon as toxic phenomena appear the patient's head should be lowered, all constrictions about neck and waist should be loosened, and

smelling salts or amyl nitrite given to inhale. Brünings extols an intravenous injection of 1 c.c. (m16 approx.) of sol. adrenalin (1-1000) in ten times its quantity of water.

For the ordinary general discomfort that so often follows minor operations and examinations under cocaine the best remedy is a cup of hot black coffee.

Substitutes for Cocaine.—As we have already remarked, cocaine should not be used for infiltration anæsthesia. For this purpose *eucaine* (4 per cent. solution in water), with or without a few drops of adrenalin solution (1-1000), is a highly satisfactory substitute.

As anæsthetics for mucous surfaces, neither *novocaine* nor *eucaine* is as effective as cocaine, but of the two perhaps *novocaine* is the more satisfactory. I have also found *stovaine* to be a very reliable local anæsthetic.

The Cocaine Habit.—The possibility of initiating the cocaine habit in out patients should not be forgotten. For this reason, it is better not to name the anæsthetic to the patient, and when patients come regularly for such minor manipulations as Eustachian catheterization the little operation may be performed without any anæsthetic.

CHAPTER III

AFFECTIONS OF THE PHARYNX AND TONSILS

ANATOMICAL ABNORMALITIES

Perforations of the Anterior Pillars of the Fauces are not uncommon. They are often bilaterally symmetrical, and this feature, combined with an absence of scarring, has led to the belief that they must be of congenital origin. As against that view, there is the undoubted fact that Sir Robert Woods, of Dublin, and other reliable observers have seen them in process of formation in severe scarlatina. That this is probably the origin of all such perforations is supported by the circumstance that they have not, so far, been reported as occurring in young infants, and that the patients have or have had enlarged tonsils, the swelling of which during the attack causes the perforation by pressure atrophy.

The condition gives rise to no symptom, and requires no treatment.

A fenestra in the anterior pillar may also be produced in enucleating the tonsil with the guillotine, the pillar being nipped from behind by the blade of the instrument as it is being pushed home. The knowledge of this possibility is sufficient to prevent it becoming a reality, but if it should occur a single suture at the operation will close it permanently.

Bifid Uvula, which is a partial cleft palate, is also of no practical importance.

Perforation of the Palate, hard or soft, is a syphilitic manifestation (see later, p. 85), and so also are the densely adherent and stellate scars occasionally seen in the throat.

Adhesion of the Soft Palate to the posterior pharyngeal wall, when associated with evidences of old ulceration and destruction of tissue, is usually syphilitic, but Vincent's angina in its severer manifestations is said also to cause ulcerations as deep and as extensive as those of syphilis. It must be confessed, however, that the distinction between ulceration of the pharynx due to syphilis and that due to Vincent's angina is not always easy to make. (See p. 36.) In many such cases the syphilitic ulceration and the subsequent scarring have done more than lead to a simple adhesion of the palate to the posterior pharyngeal wall. They may

have completely obliterated the naso-pharyngeal space, the whole being filled up with tough, dense cicatricial tissue.

Adhesion of the soft palate to the posterior pharyngeal wall as a rare *sequela of scarlet fever* is described, and the writer has reported one such case in which the adhesion was complete. In this variety scarring is inconspicuous, or entirely absent, and the distortion of the pharynx characteristic of the syphilitic variety is absent.

Finally, cicatricial closure of the naso-pharynx may be the result of over-zealous operating on tonsils and adenoids. This variety, however, is also rare, whereas a cicatricial thinning and tension of the soft palate, apart from adhesions, is by no means uncommon after a perfectly planned and executed tonsillectomy.

The *symptoms* vary according as the adhesion is complete or partial.

If *complete* the patient is unable to breathe through the nose, to smell, or to appreciate flavours, and the voice has the flat, toneless character of nasal obstruction.

If *partial* the difficulty of nasal respiration is chiefly manifested in an inability to blow the nose freely, while mouth-breathing, especially at night, is habitual.

Diagnosis.—Inspection is sufficient to reveal the cause in the syphilitic adhesion, but in the scarlatinal type the obstruction is only to be discovered by naso-pharyngeal examination. The latter type must be differentiated from occlusion of the posterior choanæ. (See p. 249.)

Treatment.—The treatment of cicatricial occlusion of the naso-pharynx by surgical reconstitution of the cavity is extremely difficult. It is, no doubt, easy under an anæsthetic to re-form the cavity by a division of the tough adhesions which occupy it; but the difficulty lies in preventing their recurrence. For this a couple of sufficiently long drainage-tubes may be passed in through the nose and out by the mouth, and retained in that position during the healing of the wound. Tying the loosened soft palate forward to the incisor teeth with silk or with flexible silver wire (A. Logan Turner) is another device which has been successfully tried.

No operation should be performed at all in syphilitic cases unless the surgeon is sure that the original disease is entirely quiescent. Otherwise he may light up new ulceration and leave the patient worse than before.

Large, **Pulsating Vessels** are occasionally visible on inspection on the posterior or lateral pharyngeal wall. They would probably deter one from operating, if seen, but adenoids have been removed without injuring such vessels.

Cases are known where a loop of the internal carotid has occupied the tonsillar region, and has been excised by the guillotine, with immediately fatal results.

An **elongated** and curved **styloid process** occasionally presents as a sharp bony process in the tonsillar region. It may cause pain, in which case it should be removed by cutting bone forceps after its exposure through an incision (Macleod Yearsley).

Congenital Shortness of the Hard Palate is a condition to which Brown Kelly in this country has drawn attention. It is rare, but not so rare as was at one time supposed. One can recognize it by the abnormally large gap which lies between the posterior surface of the soft palate, itself normal in size, and the posterior naso-pharyngeal wall. The subjects of this abnormality do not necessarily speak through the nose ; but they are liable to become deaf from post-nasal and Eustachian catarrh.

PRESSURE DIVERTICULUM OR PHARYNGEAL POUCH

(Fig. 4) is found springing from the posterior wall at the junction of the pharynx with the œsophagus. It seems to be due to a congenital



FIG. 4.—Pharyngeal Pouch (removed by W. H. Kelson).

defect or weakness in the muscular coat of the lower pharynx. As a result of the weakness in the wall, a pouch is gradually formed lying between the œsophagus and the vertebral column. Thus, a pouch is in reality a hernia of the lower pharynx emerging, according to Killian, at the junction of the oblique and transverse fibres of the inferior constrictor muscle.

Ætiology.—According to one view the weakness is congenital, as it is in abdominal hernia. According to another, the pouch is produced by the mechanical pressure of food imperfectly masticated and hurriedly swallowed.

Perhaps, also, as the older writers said, it may arise from the pressure of a large foreign body, passing through or lodged in the pharynx. Pouching is commonest in males, and rarely gives rise to trouble before the age of thirty.

Symptoms.—Food passes into the pouch, and is regurgitated into the mouth some little time after it has been swallowed. On examining with



FIG. 5.—Skiagram of Pharyngeal Pouch. (By Dr. C. Thurstan Holland.) Compare with Fig. 6.

the laryngeal mirror, and exercising, at the same time, pressure over the upper part of the neck, food and saliva may be seen pouring out of the slit-like orifice of the pouch. When a bougie is passed, it will generally become engaged and arrested in the diverticulum.

Under examination by the X-rays and the screen, and by getting the patient to swallow some water containing bismuth or barium, the shadow may be seen passing into the pouch and stopping short in the neck instead of disappearing into the thoracic cavity as it does when the bismuth passes down into the normal cesophagus. (Fig. 5.) The skiagram in post-cricoid cancer and that in a pharyngeal pouch may resemble each other rather

closely, but the lower edge of the shadow in the former is broken and even ragged, in the latter clean and well-defined. (Figs. 5 and 6.)

Examination by the direct tube (see p. 209) is difficult, as the posterior pharyngeal wall leads directly into the sac, and if any force is used, the tube will tear through the thin membranous fundus.

The *Diagnosis* may be made by observing the emptying of the sac from



FIG. 6.—Skiagram from Post-cricoid Carcinoma. Compare with Fig. 5.

outside pressure. Otherwise, the symptoms are very similar to those of stricture, and the diagnosis may be dependent entirely upon the examination by X-rays.

Treatment.—The patient soon learns to empty the pouch by pressure from without after meals. It may be removed by operation if its interference with nutrition is leading to loss of weight. An incision is made along the anterior border of the left sterno-mastoid with its centre opposite the cricoid cartilage, and access to the pouch obtained by dissection down to the inner side of the carotid sheath, in the course of which the omohyoid muscle and the superior thyroid vessels must be ligatured and divided. The pouch is cut off level with the œsophago-pharyngeal wall,

the opening being carefully stitched and the wound in the neck drained.

Note.—The pouch should be emptied just before the operation, or its contents may be regurgitated into the larynx during anæsthesia.

Some surgeons prefer to perform the operation in two stages, with the object of minimizing the risk of septic mediastinitis. At the first *séance* the pouch is exposed, raised, and temporarily stitched to the upper part of the wound. At the second, it is removed and the pharyngeal opening is closed.

William Hill omits the second stage altogether, stitching the pouch in an inverted position and leaving it unopened.

Recurrence occasionally follows these operations.

SORE THROAT (PHARYNGITIS AND TONSILLITIS)

General Consideration.—Acute pharyngitis may be the prodromal event of influenza, measles, scarlet fever, typhoid fever, or smallpox; of the common catarrhal fever or “cold”; of lacunar tonsillitis, or of peritonsillitis; while it may be due to syphilis, or, it is said, to gout and rheumatism. It may also be the usher of the severer septic inflammations of the throat; and finally, drugs, such as arsenic, iodide of potassium and mercury may cause acute pharyngitis.

The pathological changes consist in hyperæmia and inflammation of the mucous lining of the pharynx, together with a varying amount of necrosis of the superficial epithelium and altered mucous secretion.

The *symptoms* vary with the severity of the attack. In the milder cases a short initial stage of *malaise*, with some chilliness, seldom amounting to actual rigor, is followed by symptoms indicative of a certain amount of general infection—pyrexia, headache, muscular weakness and loss of appetite. Locally, stiffness and soreness in the throat on swallowing are experienced, and signs of extension of the catarrhal process to the nasal passages or to the larynx are not uncommon. After a few days the symptoms gradually subside, and the patient recovers.

In the severer cases the symptoms are more acute; the throat is more painful, the fever higher, and the other constitutional phenomena more marked.

On examining the throat, the fauces, tonsils and posterior pharyngeal wall will be seen to be uniformly and more or less deeply congested. The uvula is red and œdematous. If the tonsils seem to be the chief seat of the inflammation, we name the disease *tonsillitis* rather than pharyngitis.

Pharyngitis may be but one aspect of a general catarrhal infection, in which the nose, the larynx, the bronchi and even the lungs participate.

Diagnosis.—Care should be exercised not to be satisfied with the diagnosis of simple pharyngitis until the course of the illness enables us to be quite sure that the “sore throat” is not due to measles, scarlet fever, diphtheria, or to one of the forms of the more serious septic pharyngitis.

Treatment can only be symptomatic until the cause has declared itself.

If there is much fever and malaise the patient should go to bed, but the milder cases may remain ambulant.

Locally the use of gargles or throat-paints relieves the sore rawness, especially if glycerine forms the basis of the application. Steaming the throat (inhalation) with $\text{m} \vee$ of carbolic acid in a pint of boiling water also gives relief.

Externally, a wet compress of lint with a generous covering of gutta-percha tissue may be applied to the front of the throat, and held in position by a woollen bandage.

Internally, the patient's general discomfort may be mitigated by 10 gr. of aspirin every four hours while we are waiting the development of the symptoms.

Note.—As the bacteriological knowledge of the different clinical varieties of acute and subacute inflammations of the pharyngeal regions is still incomplete, it is impossible to make a strictly logical classification of these diseases.

The following is the arrangement we shall adopt :

ACUTE INFECTIVE PHARYNGITIS ("SEPTIC SORE THROAT," "SEPTIC THROAT")

1. Acute Tonsillitis and Pharyngitis ("Hospital Sore Throat").
 - (a) Tonsillar Abscess ;
 - (b) Peritonsillar Abscess ;
 - (c) Adenoiditis ;
 - (d) Lingual Tonsillitis.
2. Membranous Tonsillitis and Pharyngitis ("Membranous Sore Throat").
 - (a) Non-diphtheritic and "Septic" or Simple Membranous Tonsillo-pharyngitis ;
 - (b) Vincent's Angina ;
 - (c) Diphtheria.
3. Virulent septic (septicæmic) Pharyngo-tonsillitis (Gangrenous Sore Throat ; or Acute Cellulitis ; or Acute Œdema of the Pharynx, Larynx, etc. ; or Ludwig's Angina).
4. The Pharyngitis of the Infectious Fevers.
5. Retro-pharyngeal Abscess.

ACUTE TONSILLITIS

is sometimes divided into the three varieties : (a) Catarrhal ; (b) Lacunar or Follicular ; (c) Parenchymatous ; but these are in reality merely different stages in the same disease, and may be described together.

Ætiology.—The tonsils may be looked upon as exposed lymphatic glands. Consequently any septic invasion of the regions which they drain, the

nasal cavities, the naso-pharynx, and the pharynx itself (exclusive of the tongue), may induce tonsillitis. Thus, acute tonsillitis is common after operations on the nose and in nasal accessory sinusitis. But there is no doubt, also, that the tonsils may become primarily infected, the causative organism entering, just as the tubercle bacillus does, by the pharyngeal surfaces and crypts of the organ. And this type of the disease is predisposed to by any cause lowering the general health, such as overwork, anxiety and exposure, as well as by local diseases, like pyorrhœa alveolaris and dental caries, which favour the presence of septic organisms in and about the throat. It is also favoured by disease proper to the tonsils themselves, where presumably the local resistance is reduced. Thus, recurrent tonsillitis is nearly always associated with more or less enlargement of the tonsils. But it should not be forgotten that the disease may attack small tonsils, and, indeed, that a septic infection of the tonsil region has been known to occur even after the tonsils have been enucleated.

The disease in epidemic form has been traced to infected milk, but sewer gas and bad drains, at least in the patient's own residence, have probably no part in the causation of septic tonsillitis.

Acute rheumatism is an effect, not a cause of septic tonsillitis.

Bacteriology.—Acute tonsillitis is of microbic origin, and any of the pyogenic organisms may be grown from the surface exudate. The infection is usually mixed, strepto- and staphylococci being the commonest organisms found. But as all these may be recovered from the healthy mouth or throat, it must be admitted that the real bacteriological factor in the ætiology of acute tonsillitis is still unknown. Milk-borne epidemics, however, of which not a few are on record, have been attributed generally to the *Streptococcus hæmolyticus*, that organism being found in one instance in an infected cow's udder as well as in a milker's sore throat (Benson and Sears). Not infrequently, also, a pure pneumococcus infection is found in acute sporadic tonsillitis.

Pathology.—The inflammation varies in incidence according as the disease affects chiefly the surface, or the crypts, or the substance of the gland. In any case, however, the crypts tend to become filled with inflammatory *débris* and exudate, and this material appearing at their orifices gives the characteristic "spotted" appearance to the inflamed gland. The body of the tonsil occasionally becomes the seat of abscess, by the coalescence of small pus foci, and in a proportion of cases the inflammation traverses the capsule and sets up a cellulitis in the pharyngeal connective tissue deep to the tonsil (peritonsillitis), which, leading to abscess formation, is the familiar peritonsillar abscess or quinsy.

Acute septic tonsillitis is accompanied or followed by acute rheumatism not infrequently; by acute endocarditis, chorea, and other evidences of the mitigated pyæmic affections. But genuine pyæmic abscesses do not form.

Symptoms.—The onset of the illness is apt to be sudden. After some shivering or a rigor, the temperature rises to from 100° to 103° F.; the pulse

becomes rapid 100 to 120 per minute; there is severe muscular prostration; perspiration; anorexia; headache and constipation. Some nocturnal delirium may occur. The tongue is covered with a thick, yellowish fur, and is indented round the margins by the teeth. Pain and soreness in the throat, when complained of, lead to an examination, and the true cause of the attack is soon discovered. But it frequently happens that a day or two elapses before the patient feels any sore throat, and, indeed, the phenomena of rheumatic fever may actually develop without the patient making any complaint whatever about his throat, and the disease there is not discovered at all unless an examination is made.

This latency of throat trouble is specially common in children. Hence the invariable clinical rule: **In all feverish attacks in children, examine the throat** as a matter of routine.

Latency also characterizes the tonsillitis following nasal operations.

In other cases, however, the pain and soreness in the throat are very distressing. Swallowing causes severe pain, and yet the patient is tormented by an uncontrollable inclination to swallow.

When the swelling of the tonsils is great, the respiration is impeded to the extent of compelling the patient to utilize his mouth in breathing, while the respiration is stertorous during sleep. As a matter of fact, however, the local pain and general misery combine to keep the patient awake, and the ability to get some sleep is often the first sign of approaching convalescence. The temperature runs a remittent course between 100° and 103° F., falling very gradually to the normal.

The voice is nasal. The head is stiffly held, and the patient may become a little deaf.

The most severe cases are those in which the interior of the tonsil becomes the seat of abscess, as in that case the local swelling and pain are greatest.

Examination shows an acute pharyngitis, in which the tonsils are specially involved, being swollen and projecting from behind the anterior pillar of the fauces. Their surface presents small, yellowish-white spots, which, in the severer cases, coalesce and give the appearance of a membrane. And, indeed, the exudate may at times be actually tough and membranous. As a rule, however, it is pultaceous and non-adherent. The lymphatic glands at the angle of the jaw are enlarged and tender.

Course.—The illness lasts from four or five days to a fortnight or three weeks, excluding complications. The convalescence is tardy, and may be interrupted by relapses.

There is a surprising amount of muscular and constitutional weakness left, and several weeks must elapse before the last effects even of uncomplicated attacks disappear.

If the cause is allowed to remain, recurrent attacks are to be expected.

Diagnosis, as a rule, is easy. The attack is differentiated from diphtheria by the high temperature; by the absence of profound asthenia; and by the bacteriological examination. The last should never be omitted, as

diphtheria may induce a tonsillitis indistinguishable clinically from the simple septic disease.

Tonsillitis, or what looks like simple lacunar tonsillitis, is frequent in scarlet fever. It may, indeed, be the only obvious sign of that disease. But scarlatinal tonsillitis is associated with a bright, vivid redness of the whole of the pharynx, and with a rapid pulse; while the rash, if present, is characteristic with its myriads of red points so close set as to seem like a diffused blush on the skin. (We may here interpolate the useful hint that the scarlet fever rash is most easy to recognize when it is inspected through a large convex reading-glass.)

In sporadic septic tonsillitis, as well as in the epidemic form so common in hospitals and other institutions, the *Prognosis* is favourable, as far as life is concerned. The possibility of serious sequelæ like acute rheumatism, with all its dangers and disabilities, no doubt renders the outlook uncertain: and we may remember that grave septic infections like osteomyelitis of the long bones in children, ulcerative endocarditis, and, it is said, appendicitis, are sometimes traced to acute tonsillitis. Still, such sequelæ and accidents are uncommon, so that the statement just made may be regarded as a correct summing-up of the prospective chances.

It would seem that persons once attacked by acute septic tonsillitis are liable to further attacks, as recurrences at intervals of months or years are by no means unusual.

In the epidemic form of the disease that is set up by a milk-borne infection the immediate risk to life is much greater, as Benson and Sears, whom we have already quoted, report no fewer than 22 deaths in an epidemic of 487 cases.

Treatment.—The patient is kept in bed and is given whatever food he is able to swallow.

It is a usual rule to give internally salicylate of soda, in 10-gr. doses every four hours, or acetyl-salicylic acid or aspirin (gr. x). But it is questionable whether these have anything other than a sudorific effect.

The tonsillitis following nasal operations may be aborted in twenty-four hours by a dose of antistreptococcus serum (25 c.c.).

Perhaps the most useful topical agent is sol. hydrogen peroxide (10 vols. per cent.), as a spray or gargle, or what is better as a direct application to the interior of the crypts on a cotton-tipped probe. It cleanses the crypts, and, reducing the septic absorption, materially improves the constitutional symptoms.

In children, liq. ferr. perchlor. $\mathfrak{mvi}$ to x with glycerin every four hours is a favourite remedy internally.

In the milder cases treatment is often very successful. In the severer cases, on the other hand, the disease seems to pursue its own self-limiting course independent of our therapeutic efforts.

The subsequent care of the patient involves a watch being kept for acute rheumatism, endocarditis, albuminuria, and paralysis. The last, appearing after a sore throat of any kind, generally means that the disease

has been diphtheria, although unilateral paralysis of the soft palate, larynx, tongue, trapezius and sterno-mastoid may follow influenza, or—a great rarity—peritonsillar abscess. (See p. 32.)

If lacunar tonsillitis attacks a patient more than once, the tonsils should be enucleated.

Tonsillar Abscess.—Abscess in the body of the tonsil is an occasional result of septic tonsillitis. Its presence is denoted by swelling of the body of one tonsil persisting after the acute stage of the tonsillitis is over.

It may escape notice if it points and breaks on the posterior or inferior aspect of the gland. If discovered, the abscess should be opened by an incision.

PERITONSILLAR ABSCESS (QUINSY)

Ætiology and Pathology.—Peritonsillar abscess develops in the cellular tissue above and in front of the tonsil, and is due to a septic cellulitis of this region. The infection is secondary to sepsis, which may be latent, but is often active, of the tonsil itself, especially of the supra-tonsillar fossa, which, it will be remembered, passes through the tonsil from the surface to terminate in a *cul-de-sac*, the end of which is devoid of any tonsil tissue and is in direct contact with the capsule. As the abscess develops in the palato-pharyngeal cellular tissue, it pushes the tonsil itself downwards and backwards, and so out of sight of the examining eye. Left to itself, the abscess sooner or later bursts, usually through the anterior pillar of the fauces.

The remarkable fact that the abscess so seldom finds its way out or down into the deep planes of the neck seems to be due, first to the visceral layer of the deep cervical fascia, which keeps it confined to the peritonsillar cellular tissue, and secondly, to the firm attachment of the superior constrictor of the pharynx to the lower pole of the tonsil, whereby gravitation of the pus downwards is effectually prevented.

Symptoms.—The onset is sudden, unless there has been a previous attack of tonsillitis.

Unilateral pain shooting up into the ear draws attention to the throat, and even in its earliest stages the pain is so characteristic that the patient, if he has ever had a quinsy before, at once realizes that he is in for another. The pain and infiltration render swallowing both painful and difficult. This is accompanied by the usual signs of a severe septic focal inflammation—malaise, asthenia and pyrexia (about 102° F.), which, with the difficulty in swallowing, cause great misery. As the disease progresses and pus forms, the constitutional phenomena undergo some mitigation, and the pain becomes a little easier, but genuine relief is only obtained—though then with pleasing promptitude—when the pus is evacuated.

The aspect of the patient is characteristic. He sits up in bed, with his head inclined to the side of the disease, and usually supported by the corresponding hand. The face is pallid, the mouth is half open; the teeth and

breath are foul, and his expression is that of patient misery. He holds the head and neck stiff, and when he turns to look, does so from the shoulders.

Examination.—The mouth can only be partially opened, and examination is difficult, but it may be facilitated by getting the patient to grin, so as to admit more light into the mouth. There is great swelling of the tonsillar region, faucial pillar, and soft palate on the affected side. The tonsil is out of the line of view, and need not be looked for. Fluctuation cannot be determined by palpation. The inflammation affects the whole of the throat, and the uvula is swollen and semi-translucent from œdema. The tongue also is swollen, tooth-indented, and covered with thick fur.

The corresponding side of the neck is swollen and tender, and the upper carotid group of the lymphatics is enlarged.

Course.—After from four to ten days of pain, insomnia, dysphagia and anorexia, the abscess bursts, often during sleep, with immediate relief to all the symptoms, and in a few days the patient resumes his normal life. But a second attack, on the other side, is by no means uncommon.

Results.—In spite of the manifest severity of the illness, and the formation of a pus-collection under high tension in the near neighbourhood of important vessels and nerves, serious complications are unusual, and fatalities are very rare, except in weakly and debilitated persons. But grave accidents do occur at times. The sudden rupture of the abscess into the throat has been known to flood the larynx with pus and to cause asphyxia and death. In addition, Wylie and Wingrave, and E. Wessly have recently reported cases of fatal thrombosis of the internal jugular vein and cavernous sinus respectively, and the last-named observer has also seen pyæmia following a quinsy. Another rare but less serious sequel is transitory paralysis of the jugular syndrome type (see p. 31), of which V. Palumbo reports a case.

Diagnosis.—The appearances in quinsy are so characteristic that it is seldom likely to be mistaken for anything else. Nevertheless, there are two sources of error which, though rare, should be remembered. In the first place, a sarcoma of the tonsil region, particularly if the mucosa is congested and reddened, may resemble peritonsillar abscess so closely as to deceive even the elect. Pyrexia, however, is usually absent, and exploration will fail to reveal pus. With the passage of time, of course, discovery of the error is inevitable, but it may come too late to save the surgeon's reputation. Secondly, in certain rare cases of purulent otitis media pus from the ear tracks under the petrous and reaches the pharynx and soft palate, where it may look like a true peritonsillar abscess. But in these cases, apart from the presence of purulent otitis media, the movements of the lower jaw are less restricted and the pharynx as a whole shows less tumefaction and œdema. As it happens, a mistake in this instance would not entail serious consequences, as opening the pharyngeal swelling effectually drains such an abscess. (See p. 517.)

Treatment.—Attempts may be made to abort quinsy in its earliest hours by *mj* *tc*, *aconit.* every hour, a useful prescription being—

R	Tc. Aconit.	.	.	.	.	.	.	.	mj
	Antipyrin .	.	.	.	.	.	.	.	gr. j
	Caffein. Citrat.	.	.	.	.	.	.	.	gr. v
	Aq. ad	.	.	.	.	.	.	.	℥j
									M.

General.—The patient may be kept in bed, but is often easier sitting up in a chair. His diet consists in whatever he can get down, such as raw eggs, milk, custards and slops generally. Any treatment which necessitates swallowing adds to the misery, and therefore all internal remedies by the mouth should be avoided. The same is true of local treatment by gargles,



FIG. 7.—Site of the Incision for Peritonsillar Abscess.

sprays and douches, with the solitary exception of a warm solution of sod. bicarbon., which cleans the throat by “cutting” the mucus.

As early as the third day, if not before, an attempt should be made to evacuate the abscess. First of all, if the mouth can be opened wide enough to admit the surgeon's finger, the palate should be palpated, so as to determine the outer margin of the deep, tense swelling, as it is in this direction that the pus is most likely to be encountered. A spot is next selected corresponding to what under normal conditions would be the intersection of a line tangential to the curved edge of the anterior faucial pillar with a line drawn through the base of the uvula. (Fig. 7.) After anæsthetizing this area with 10 per cent. solution of cocaine containing a little adrenalin, the mucous membrane is incised with a long-handled, short-bladed knife.

Then a closed pair of dressing-forceps is inserted into the incision, pushed forcibly backwards, upwards and outwards, opened, and withdrawn open. If the abscess-cavity is penetrated, a gush of pus follows the withdrawal of the instrument. If pus is not encountered, a further search may be made for it with a grooved director, if the patient permits.

The operation is painful, and the patient's head should be held firmly by a nurse. Failing skilled assistance, seat the patient with the back of his head to a wall so that he cannot jerk back out of reach when the forceps are being inserted. A general anæsthetic is dangerous, and should not be employed.

Even when pus is not found, the patient experiences relief from the operation. But when it is found, the relief is instantaneous and complete. A simple antiseptic gargle suffices to complete the cure.

But a peritonsillar abscess is sooner or later followed by another on the same side unless the chronically diseased tonsils (which are the cause) are eradicated. Such tonsils may be quite small and inconspicuous on examination; but their size is no clue to their virulence.

Adenoiditis.—The frequently recurring "colds" to which children with adenoids are subject are undoubtedly due to attacks of septic inflammation affecting the adenoid masses. Abscess formation is rare.

The *symptoms* are those of acute catarrh, with feverishness and an aggravation of the obstructive phenomena. (See p. 391.) These last may, indeed, be entirely absent save during such attacks. It is at these times also that infection is most liable to extend along the Eustachian tube to involve the middle ear.

The *treatment* is that of acute catarrh, followed, after the subsidence of the feverish symptoms, by the removal of the adenoids. (See p. 395.)

Lingual Tonsillitis is a not uncommon accompaniment of septic lacunar tonsillitis. The laryngeal mirror shows the red and inflamed masses studded with white spots. The treatment is the same as that for lacunar tonsillitis.

Abscess of the Lingual Tonsil occasionally follows septic inflammation of this area; or it may be due to puncture by a sharp foreign body such as a fish-bone; dental abscess also may burrow in this region.

The *symptoms* are: severe pain with dysphagia, and sometimes a sensation of choking, or actual dyspnoea from obstruction by the inflamed mass. Constitutional signs of fever, malaise, and so on are also to be looked for. The mouth can be opened, but protrusion of the tongue is painful and impeded. (Edema externally in the submaxillary region and under the chin is occasionally present.)

The diagnosis is made by the laryngeal mirror, which shows a bulky, rounded, red swelling at the base of the tongue, more prominent on one side than on the other. The epiglottis may only be seen with difficulty; it is frequently œdematous; and it is generally impossible to see into the larynx. The picture may be difficult to interpret unless one is careful to

follow the contour of the swelling *forward*, when it can be seen to merge into and become continuous with the dorsum of the tongue. The abscess can also be felt, even in its early stages, on bi-digital examination, one finger being placed on the swelling at the base of the tongue, and the other in the middle line of the submaxillary region anterior to the hyoid bone.

Diagnosis.—Abscess of the lingual tonsil is differentiated from simple hypertrophy, or from a lingual thyroid tumour by the pain, temperature, and signs of inflammation.

Treatment.—As soon as it is diagnosed, the abscess should be opened under cocaine anæsthesia. The tongue is held out by an assistant, and, guided by the laryngeal mirror, a long-handled, curved knife is carried to the back of the tongue, and, with the point and cutting edge turned downward, is plunged into the abscess. The little operation is not easy to perform, as the knife tends to glide off the slippery, resilient surface. A general anæsthetic should not be employed.

MEMBRANOUS TONSILLITIS AND PHARYNGITIS

The formation of a false membrane in the throat may be due to infection by (1) streptococcus; (2) more rarely staphylococcus; (3) the spirillum and fusiform bacillus of Vincent; (4) the Klebs-Loeffler bacillus (diphtheria).

In the **septic** (streptococcal and staphylococcal) varieties, the membrane forms on the tonsils first, and in the majority of cases it remains limited to them.

Symptoms.—There is considerable sore throat aggravated on swallowing, with high fever (102° to 104° F.), headache and prostration. The tongue is coated with a thick, white fur, and the glands at the angles of the jaw are enlarged and tender.

On inspecting the throat, the whole pharynx is seen to be generally congested; the tonsils are enlarged, inflamed, and invested, more or less with yellowish, false membrane, which may also extend on to the faucial pillars and soft palate. The breath is foetid.

The illness lasts for a week or ten days, running a course very similar to that of lacunar tonsillitis, and terminating in recovery almost invariably. Exceptionally, death may result in weakly children or adults.

The *diagnosis* raises the all-important question of diphtheria.

Clinically, the septic throat is more painful, the fever is higher and more prolonged, the pulse is faster, and, in short, all the reactionary phenomena are more lively, and the patient does not look so ill as in the graver disease.

Locally, the false membrane is as a rule less tough and less closely adherent than that of diphtheria, and the underlying surface, not being ulcerated, does not bleed when the membrane is artificially separated.

But these distinctions are merely suggestive. There is only one reliable method of differentiating between the septic sore throat and diphtheria, and that is by bacteriological examination. In no case should this be omitted or postponed.

Treatment.—Until the diagnosis is established, the case should be treated as one of diphtheria, the patient being isolated, and a full dose of anti-diphtheria serum given at once. Otherwise the treatment of simple membranous pharyngitis is the same as that for acute septic tonsillitis and pharyngitis (*q.v.*).

VINCENT'S ANGINA

Etiology.—On the ulcers of this disease a fusiform bacillus, together with the *Spirochæta dentium*, exists in great numbers. Hence it has been assumed that the ulceration is produced by the action of these organisms. This may be, and probably is, a correct assumption, but it has not yet been proved.

These organisms are normally found in the mouth, particularly around and in any septic focus, such as a carious tooth or pyorrhœa alveolaris. They have also been found in cervical abscess, in ear discharges, and even as far afield as in brain abscess (Wyatt Wingrave), and in foetid bronchitis. In these conditions also the significance of the organism is not clear.

The *fusiform bacillus* of Vincent is a long organism with tapering ends; it is Gram-negative, and can be cultivated in media to which blood-serum has been added. The spirillum (*Spirochæta dentium*) is long, thin, and disposes itself in irregular spirals or lashes. Wingrave has suggested that these are two modifications of one and the same organism.

Vincent's Angina has recently been very widely disseminated among soldiers. It is feebly contagious.

Symptoms.—The disease runs a subacute or chronic course. The temperature may be normal throughout, and, in any case, rarely exceeds 101° F. The local symptoms are also mild; the soreness is slight, and the chief complaint is of the fœtor, and that is, indeed, objectionable.

On examination in the earliest stage of the disease, the tissue at the site of infection has a homogeneous grey look, like indiarubber. Later, this breaks down into an ulcer with abrupt edges and red, irregular floor, devoid of membrane or secretion. The disease usually attacks one tonsil only to begin with. At a still later stage the ulcer is covered with a foul dark-grey membrane, easily removed, and pultaceous in consistency. The underlying surface shows irregular granulations which bleed when touched. The ulceration, although usually unilateral and limited to the tonsil, occasionally goes on to affect other parts of the pharynx, and may even, it is said, lead to considerable destruction. Fatal cases are encountered, but recovery is the rule in from seven days to two months. The cervical glands are enlarged, and the neck itself is often puffy and swollen.

Diagnosis.—The disease is distinguished from diphtheria by bacteriological examination.

From tertiary syphilis the distinction is hard to make, inasmuch as its appearance closely resembles the tertiary ulceration; secondly, the Wassermann reaction is said to be frequently positive in Vincent's Angina; and

finally, both diseases are amenable to the action of potassium iodide or to salvarsan internally. The diagnosis, therefore, will turn upon the presence or absence of other syphilitic phenomena.

We ought to add, however, that many reliable observers hold that the Wassermann reaction in cases of Vincent's Angina is never positive unless true syphilis is also present in the system (Taylor and McKinstry).

Treatment.—If possible the surgeon should himself cleanse the ulcer by picking off the membrane, and by spraying its surface with hydrogen peroxide (10 vols. per cent. solution). After mopping it dry, *tc. iodi.* should be accurately applied on a swab. Wingrave recommends trikresol (5 per cent. sol. in alcohol), or lysoform (25 per cent. in aq.). In the severer cases salvarsan in solution may be applied locally, or it may be administered intravenously as in syphilis, with immediate and striking success.

DIPHTHERIA

Diphtheria is due to the local growth in a virulent form of the Klebs-Loeffler bacillus. After inducing simple hyperæmia, the toxins of the bacillus cause necrosis of the epithelial layers of the mucosa, and thus produce the false membrane from which the disease gets its name.

The infection is conveyed by direct contact or indirectly through fomites. Epidemics spring up from infected milk and from "carriers."

Incubation is short—from two to six days.

Symptoms.—The onset is insidious, especially in children, by whom no complaint of sore throat may be made—a fact which renders it imperative always to examine the throat in an ailing child. At first the fauces are simply reddened, and no hint of the true nature of the malady is afforded by the local appearances. But even at this stage there may be considerable general disturbance, shown in weakness, pyrexia, and increased pulse-rate; while in children, sickness and vomiting frequently occur.

In a day or two the throat gradually assumes the typical aspect of diphtheria, the membrane forming as a tough greyish-white or white pellicle on the tonsils or uvula, and gradually spreading to invest, according to the severity of the case, more or less of the mucous surfaces of the soft palate, pharynx, larynx and nose.

For a day or two there may be an apparent disproportion between the local signs and the constitutional disturbance. The temperature may be normal or subnormal, and the patient, for a time, appears to be easy and bright, although the membrane goes on extending, and the occurrence of secondary infection by septic organisms is manifested by the foetid breath, the discharges from the mouth and nose, and the enlarged and tender lymph-nodes behind the angles of the jaws. In these cases death may suddenly occur from heart failure.

As a rule, however, general toxæmic symptoms are noticeable during the first day or so in the grey and earthy complexion, clammy skin, and

compressible pulse, and the first sign of improvement, when it occurs, is remarked in these same general phenomena.

Clinically, cases divide themselves roughly into two types—the mild and the severe.

In the mild type the local reaction is but moderate; the membrane is and remains of a white or yellowish colour and is slow in spreading; the glands at the angles of the jaw are only a little enlarged; and toxæmic phenomena are mild or absent.

In the severe cases, on the other hand, there is considerable, and it may be great inflammatory reaction in the pharynx, almost as much in some cases as in quinsy (J. D. Rolleston); the membrane is dark-brown or black and tends to go on spreading, sometimes rapidly; the air around the patient is charged with fœtor; there is much glandular, and also periglandular swelling in the neck; and the evidences of toxic absorption are pronounced.

In cases which go on to a fatal issue by toxæmia, the prostration becomes more and more profound, the pulse feeble, irregular and flickering, and the end is usually rather sudden. In all the urine generally contains albumen.

Nasal Diphtheria.—Apart from the so-called chronic nasal diphtheria, diphtheria attacking the nose always leads to an increase in the general toxæmia, and so is of evil omen. Its presence is indicated locally by an irritating discharge, which excoriates the *alæ nasi* and upper lip, and also, of course, by the presence of the membrane in the nose.

Chronic Nasal Diphtheria.—Membranous rhinitis, due to the Klebs-Loeffler bacillus, running a chronic, afebrile course and without causing any general symptom whatever is an occasional experience. The symptoms consist in nasal obstruction, with irritating discharge, and a tendency to epistaxis. Examination will reveal the membrane, of a pale fawn colour, lying more upon the mucous surface than within it, thus contrasting with the membrane as it appears in the throat.

The relative benignancy of chronic nasal diphtheria is supposed to be due to the formation by the nasal mucosa of an antitoxin—a power which, we are forced to believe, must be lost when the pharynx has been attacked first and the nose afterwards.

We may sometimes hear it said that patients with chronic nasal diphtheria are not liable to infect others. This is an error, as my own experience has proved.

We may note here, as a curious fact, that what are stated to be true diphtheria bacilli are occasionally found, without any membrane formation, in the discharges from a nose containing a foreign body. They have also been found in *ozæna*.

Laryngeal Diphtheria.—Diphtheria of the larynx is one of the causes of “croup.” When, as is usual, it comes on secondary to the pharyngeal attack, its occurrence is denoted by hoarseness, stridor, and the usual phenomena of laryngeal obstruction, proceeding, not infrequently, to serious interference with respiration, which, if unrelieved, may cause death from

asphyxia. The tendency to obstruction is more marked in children than in adults; nevertheless, in adults, laryngeal diphtheria is a very fatal form of the disease, and the mortality has not been reduced since the introduction of the antitoxin serum (J. D. Rolleston).

Primary Laryngeal Diphtheria is denoted by hoarseness, cough, stridor, and by "croup" in children. Examination with the laryngoscope in children is difficult or impossible, and, in the absence of history of a foreign body, "croup" should therefore be treated as diphtheria until a swab is taken from the pharynx and is reported to be free from diphtheria bacilli. The membrane may be coughed up. If there is much obstruction, tracheotomy or intubation should be promptly performed, as the antitoxin may not act quickly enough.

Extension of the disease to the *trachea and bronchi* is not uncommon in severe laryngeal diphtheria, particularly in children. It is an event of the gravest significance, as it may determine a continuation of the dyspnoea after tracheotomy, and, apart from that consideration, it brings with it a serious aggravation of the toxæmic phenomena.

In severe cases of pharyngeal diphtheria the disease may also attack the *œsophagus*—an extension of pathological rather than of clinical importance, perhaps.

Diphtheria of the *middle ear* sometimes occurs as a complication of pharyngeal diphtheria, the infection passing by way of the Eustachian tube. It induces intense earache, with bulging and rupture of the tympanic membrane, followed by a blood-stained serous discharge, in which pieces of membrane may be detected. It is liable, like other acute infections of the middle ear, to lead on to mastoiditis and other complications.

Primary diphtheria of the external auditory meatus is a rarity. It causes intense and persistent pain with tumefaction of the meatal wall. The diphtheritic membrane may be visible on inspection, but the real nature of the malady is liable to be overlooked until a bacteriological examination is made. It promptly yields to the antitoxin.

There are two varieties of *diphtheritic paralysis*, the myositic and the neuritic, the early and the late. The former is the cause of palatal paralysis occurring in the first few weeks, and of the cardiac failure that is responsible for so many diphtheria deaths. In the palate it produces the familiar nasal speech, with regurgitation of liquids through the nose. It may be unilateral. Myositic paralysis affecting the heart is to be feared when the first sound begins to lose tone—a symptom the gravity of which is increased when tachycardia or bradycardia appears.

The neuritic type, which usually sets in some time after the third week and may be delayed for months, varies in severity with the character of the local lesion, and for that reason it is favourably influenced by the early use of antitoxin. In most cases it does not amount to any more than a paresis. Probably the muscles of accommodation are those most frequently involved, producing difficulty in reading and so on—symptoms which are

likely to be overlooked in children. But palatal paralysis occurring after the earliest weeks is also a common occurrence. It lasts only a week or two. In most cases the paralysis does not extend beyond those groups, but in others it may spread to the muscles of the limbs and trunk, including the diaphragm. About 18 per cent. of cases of diphtheritic paralysis end fatally (J. D. Rolleston) from respiratory or cardiac failure, or from pneumonia.

Anæsthesia may also be produced.

The paralysis lasts for eight weeks or more. If the patient survives, the paralysis disappears entirely.

It occasionally happens that the sore throat preceding the paralysis has been so mild that the patient has never been laid up at all.

Diagnosis of Diphtheria.—In diphtheria the membrane is white, greyish or brown, tough, and can be detached in flakes or pieces, laying bare an ulcerated bleeding surface. In septic sore throat the membrane is friable, and the underlying surface does not bleed when the membrane is removed. In diphtheria the temperature tends to run a sub-febrile course; in septic sore-throat it is high. In diphtheria the general prostration is greater, and the signs of vigorous reaction, local and general, may be less marked than in the simple septic throat.

From Vincent's Angina it is distinguished by the temperature (normal in Vincent's angina), by the pain, by the more acute course and by the tough membrane.

In spite of those clinical differences, however, such appearances alone should never be altogether relied upon for a differential diagnosis, because diphtheritic tonsillitis or pharyngitis may be indistinguishable clinically from simple septic tonsillitis or pharyngitis. Thus it is a rule in all cases of sore throat to have recourse to bacteriological examination. Here we must utter a warning. If the bacteriological examination is negative for diphtheria, and yet the case looks like diphtheria, do not accept the bacteriological finding as conclusive. Have a second and even a third bacteriological examination made.

Further, all cases in which the clinical phenomena raise the question of diphtheria should be treated as diphtheria—isolated, and given diphtheria antitoxin, pending bacteriological examination.

In *taking a swab* of the throat for bacteriological examination, have the patient seated in the usual position for examination. Inspect the throat, and select in your mind the area best fitted for swabbing. For this, one makes for the place where the membrane seems to be most distinct and accessible. This is usually the tonsils.

↓ Withdraw the swab from the sterile tube; moisten the wool in sterile water; pass it carefully into the throat, avoiding contact with teeth or tongue; apply it firmly to the selected area, and twist it round between finger and thumb. Then withdraw it as particularly as it was inserted, and replace it within the sterile tube. If a piece of membrane can be detached, and forwarded with the swab, so much the better.

Negative bacteriological reports in true diphtheria are usually due to an imperfect charging of the swab with the morbid material.

Swabbing children's throats is difficult. The child should be held as already described (p. 17), and the surgeon will find a Doyen's gag very useful.

Simple croup, in children, is clinically differentiated from diphtheritic croup by its sudden onset, either without any prodromal event, or in the course of an acute bronchial catarrh. If it does not disappear or materially improve in a few hours, treat the case as diphtheria.

Prognosis.—Diphtheria is more severe and fatal in children than in adults, and the more widespread the local lesion, the more serious are the constitutional phenomena. A soft, flickering pulse is of evil omen. The earlier the case is diagnosed and treated with antitoxin, the better is the outlook. After the fifth day, it is said, antitoxin is of comparatively little service.

Treatment.—*Prophylaxis:* Isolation of the patient, together with the disinfection of clothing, fomites, etc., is, of course, necessary in diphtheria as in other contagious diseases. The occurrence of an epidemic calls for the scrutiny of the milk-supply as well as for a bacteriological examination of healthy contacts in order to discover possible "carriers."

"*Carriers.*"—The diphtheria bacillus may linger on almost indefinitely in the throat of patients who have recovered from the attack. It may also be found even in people who have never suffered from clinical diphtheria at all. Such "carriers" are infectious to those about them, and, as their isolation for a prolonged period is highly inconvenient, many devices have been tried to bring about the disappearance of the organism from their throat. Perhaps the most successful method of all is to perform tonsillectomy, and to remove adenoids if they are present. But many epidemiologists prefer rather to circumvent the danger by immunizing contacts, although immunization may delay its appearance for from three to six months after the effort to secure it has been made.

Immunization is sought for by administering three subcutaneous injections of 1 c.c. of a standardized mixture of toxin and antitoxin. The Schick test is then made to ascertain whether or not immunity has been secured.

The Schick test consists in the intradermic injection of 0.2 c.c. of diphtheria antitoxin standardized to contain in that dose one-fiftieth of the minimum lethal dose for a guinea-pig. If the subject tested is susceptible to the disease a red areola with œdema appears in from 24 to 48 hours at the site of injection (positive reaction); if insusceptible, no reaction occurs. A pseudo-positive reaction may appear, but it sets in earlier than the true positive, and shows no œdema. A combined true and pseudo-reaction is also described.

Inherited immunity is present up to six months (some authorities say two years) after birth, and the Schick test at this age is therefore normally negative.

In schools and institutions the test is of value in distinguishing the susceptible from the insusceptible, and the former can then be immunized if necessary, as described above.

Curative treatment.—*Antitoxin*: The following are the doses recommended by J. D. Rolleston. Mild cases are given from 4000 to 12,000 units in a single dose. Moderately severe cases receive 12,000 units, repeated each day for two days. Severe cases should be given 18,000 to 24,000 units every day for three or four days.

Children receive as large a dose as adults, and young children require a relatively larger dose, as they are more liable to be severely attacked.

The injections should be made into the vastus externus muscle of the thigh, as intramuscular injections are less painful and less liable to form abscesses than subcutaneous injections. (Antitoxin by the mouth is useless.)

The protective value of antitoxin as a prophylactic lasts only for a few weeks.

[*Anaphylaxis* is the term used to describe the reactionary phenomena which occasionally follow the injection of foreign animal substances, such as horse-serum in the case of diphtheria antitoxin. These vary in severity from urticaria and asthma to sudden death. Typically they do not occur unless the patient has had a previous serum injection at least ten days before. But some subjects react dangerously to their first dose. (See later, Horse Asthma, p. 316). The treatment of anaphylactic phenomena after their appearance is purely symptomatic. Urticaria may be ignored. Collapse is countered by stimulation and position. Recently it has been recommended, in order to avoid anaphylactic phenomena, to inject first of all 1 c.c. only of the serum, and half an hour or an hour later to give the full dose. It is necessary to add, however, that opinion is divided regarding the value of this suggestion.]

Locally, the diphtheritic throat should be kept clean with hydrogen peroxide solution (5 or 10 vols. per cent.) in water, used as spray. And the ordinary diphtheritic throat requires no more than this.

Generally, dangerous cardiac symptoms are forestalled and met as they arise. If the pulse is feeble or irregular; if there is tendency to cold extremities or any other warning of collapse, the patient should be kept strictly flat, all sudden changes of position and all straining movements being forbidden. Many authorities, indeed, carry out these rules in all cases, even the mildest.

Cardiac failure is treated by cardiac stimulants and by strychnine hypodermically.

Sir StClair Thomson recommends adrenalin (1-1000) by mouth or hypodermically, m_j to ijj , when paralysis is present, and has extended to pharynx or diaphragm, or when it threatens the heart. For diaphragmatic paralysis J. D. Rolleston gives m_{xxx} Tc. Belladonna *per rectum*, or gr. $\frac{1}{60}$ atropin hypodermically.

Otherwise, paralysis is treated by rest in bed, by fresh air, and later

by massage and electricity. It is also customary to employ strychnine in regular hypodermic doses.

For the treatment of laryngeal obstruction by tracheotomy or intubation see p. 192. For pharyngeal paralysis see p. 90.)

(For a description of the affection of the throat in scarlet and other fevers, see p. 45.)

SEPTICÆMIC PHARYNGO-TONSILLITIS (ANGINA LUDOVICI;
LUDWIG'S ANGINA; GANGRENOUS SORE THROAT; ACUTE
CELLULITIS OR ACUTE ŒDEMA OF THE PHARYNX,
LARYNX, ETC.)

Under these various titles, of which "Ludwig's Angina" is the most popular, is described a rare and peculiarly virulent and fatal affection of the throat and cervical cellular tissue, characterized by intense and widespread local inflammation, and by profound and often rapidly fatal toxæmia.

Ætiology.—Almost any of the familiar pyogenic organisms may be the cause, but the pneumococcus and the streptococci are those most commonly found. The virulence of the disease may either be due to enhanced activity of the organism, or to a lowered tissue-resistance, or to both in combination.

Pathology.—The situation and extent of the throat and neck inflammation varies with each case, one showing more pharyngeal, another laryngeal, a third cervical inflammation. But in most, all three regions participate to a greater or less extent. In like manner the local lesion varies from an acute cedematous inflammation, with or without suppuration, to widespread gangrene. But severe as the intensity of the local lesion may be, it is the toxæmia which is most to be feared, as the fatal issue, when it occurs, is due to general septic intoxication.

It is generally considered that pathologically this disease is merely an intensified form of the simple septic throat. This may be true, but it is not the whole truth, since, to the clinician, the picture presented is profoundly different from that of simple septic throat.

Symptoms.—The symptoms are those of septic intoxication more or less severe, coupled with the local phenomena. The onset may be gradual, but it is often sudden, with a rigor. The height of the temperature varies, but it is always more or less raised.

Signs of grave blood-poisoning reveal themselves in a small, flickering pulse, cold extremities and general collapse, with tendency to death from heart failure.

Locally the pharynx presents the appearance of severe pharyngitis with cedema of the uvula and soft palate. There is generally more or less laryngeal stridor, which, on laryngoscopic examination, is seen to be due to cedema of the epiglottis, arytenoids, and parts about the entrance of

the larynx. The inflammation generally spreads into the tissues of the neck, so that they become swollen and indurated, not pitting on pressure, and forming, in some, a collar-like swelling round the neck and in the submaxillary and sublingual regions.

There is remarkably little pain, but dysphagia is prominent from the muscular difficulty of swallowing, while severe and, indeed, dangerous dyspnoea from the laryngeal obstruction is a common symptom.

In the cases seen by the writer the lymphatic glands have been swollen and tender.

The severity of the symptoms, general and local, serves to distinguish it from the commoner varieties of pharyngitis.

Prognosis.—The course of the disease is brief. Many cases swiftly recover, but others as swiftly become hopeless and die. The chief factor in forming the prognosis is the general condition. If the pulse keeps good, the mind cheerful, and the extremities warm, the chances are favourable. If, on the other hand, the pulse is rapid and small, the patient anxious and depressed and the skin clammy and cold, the result is more likely to be bad.

One is apt in these cases to lay stress in one's mind upon the local difficulties of dyspnoea and dysphagia, and to think that when, for example, tracheotomy has been performed, the case will be out of danger. But that is a mistake. The chief peril lies in the absence of an effective constitutional reaction against the poison. The local difficulties can be overcome by art.

Treatment.—The profound toxæmia is met by antistreptococcus serum, 25 c.c., as soon as diagnosis is made, the dose being repeated every twenty-four hours if necessary, with general warmth and stimulants such as strychnine, ammonia and brandy. Daily intravenous injections of collosol argentum, 2·5 to 3 c.c., or of antiseptics such as hydrarg. perchlor., may be of great service. Perchloride of iron by the mouth is also useful.

Locally, warm fomentations of boric lint are applied to the swollen neck, and the patient steams the throat with boiling water, to which a few drops of carbolic acid may be added. In any case where the cervical swelling is a prominent feature in the case, free relief to the tension, or to the pus, if pus is present, should be given by incision through the skin, and the opening up of the deeper planes by blunt dissection wherever the induration seems greatest. The widespread œdema of these cases obliterates all landmarks, and necessitates careful dissection in the deeper cervical planes.

Tracheotomy should be performed at once when dyspnoea is severe. The trachea in these cases seems to lie very deep, but the dissection to reach it is easier than usual, as there is little or no bleeding.

The operation, as well as the opening up of the deep cervical planes, must be performed under local anæsthesia. The patients are too ill for a general anæsthetic.

EXANTHEMATOUS PHARYNGITIS

The Scarlet Fever Sore Throat.—In scarlet fever, the probable severity of the attack may be foretold in the early stages from the state of the throat.

Scarlatinal pharyngitis varies in degree from simple congestion to gangrenous inflammation. In the early days of the fever the pharynx presents a characteristic bright red colour, uniformly diffused over the tonsils, fauces, palate and posterior wall. In the severer cases, as time goes on, the congestion becomes more intense, there is some œdema of the uvula, and the pharynx is spotted with flakes of mucus. Later on the posterior wall presents a glazed and polished appearance. Finally, these phenomena may become less marked, and the patient gets well, or they may be followed by the formation of sloughs of the pharynx or tonsils, and from the severe general disturbance characteristic of these cases, may terminate in death. In some cases (scarlatina anginosa) these grave pharyngeal changes begin as early as the fourth day of the disease, and if the patient survives, the extensive ulcers take weeks to heal, and leave the pharynx distorted with scars and loss of substance.

The tonsils in scarlet fever may be invested with a membrane, which may be diphtheritic, but is more frequently purely septic.

The slight angina which often attacks people exposed to scarlet fever infection is, in all likelihood, scarlatinal in nature.

Œdema of the glottis, and even perichondritis of the cartilages of the larynx, may occur in scarlet fever, and the infection has a strong tendency to spread up the Eustachian tube into the middle ear, where it sets up a suppurative, which is frequently virulent. (See p. 481.)

Rhinitis is usual in all varieties of the disease. It declares itself towards the end of the first week in a thin, irritating discharge, which later on becomes thick and purulent. Crust-formation, which may continue for weeks, characterizes its later stages, and epistaxis, sometimes profuse, may occur at any stage.

There is also in scarlet fever a marked liability to the occurrence of acute septic infection of the lymph-nodes in the neck which drain the pharyngeal and tonsillar areas. These glands undergo enlargement in all cases, and in some become the seat of acute abscess.

The diagnosis of scarlet fever is seldom in doubt save in mild, sporadic cases, and then the disease is liable to be overlooked. The rash may be slight and evanescent, the angina trifling and the pyrexia transitory. Even in such cases, however, the vividly red pharynx, and, after a few days, the “strawberry” tongue, often suffice to clear up the situation, although it sometimes happens that certainty is delayed until desquamation appears.

The local treatment is that of acute septic pharyngitis.

In **Measles** there is usually considerable pharyngitis, and the rash in

the shape of red punctiform spots, sometimes with radiating streaks, appears on the soft and hard palate.

Koplik's spots have already been described. (See p. 14.)

Acute laryngitis may occur in the pre-eruptive stage of measles and continue after the rash is well out. It is sometimes sufficiently severe to give rise to "croup" and even to respiratory distress.

In **Smallpox** pustule-formation on the fauces and soft palate sometimes leads on to sloughing, and the formation of deep ulcers on those parts, with subsequent cicatricial deformity if the patient recovers.

RETROPHARYNGEAL ABSCESS

Retropharyngeal abscess may be acute or chronic. Both forms are commoner in children than in adults. Indeed, the acute type generally occurs in sucklings, and it is rare after the first year of life.

ACUTE RETROPHARYNGEAL ABSCESS

is due to septic infection of one of the chain of small post-pharyngeal lymph-nodes which lie on either side of the middle line of the posterior wall of the pharynx. Any septic nasal disease in infancy may lead to its occurrence, and it occasionally forms in scarlet fever.

Symptoms.—The general symptoms are those caused by the formation of septic abscess. The signs which direct attention to the throat are difficulty in swallowing, croupy and noisy breathing, and inability to breathe through the nose, a symptom which in very young infants always attracts the mother's attention. Fixation of the head from interference with the action of the anterior vertebral muscles, and perhaps from interference with the sterno-mastoid, is generally a marked feature.

On examination, a matter of difficulty in young infants with small mouths and the excessive mucous secretion common in this condition, bulging of the posterior pharyngeal wall will be seen. Palpation shows the bulging to be soft and perhaps fluctuant. As a rule, the swelling is lateral rather than central. There is concomitant general pharyngitis, and œdema of the larynx may be taken for granted when croupy breathing is present.

If the abscess is not opened, it tends to burrow downwards into the mediastinum, with fatal results, or if it bursts spontaneously into the pharynx, it is likely to asphyxiate the infant.

Treatment.—The opening of these abscesses was at one time regarded as dangerous, but when properly performed there is no risk.

An anæsthetic is not given. The child lies on its back on the nurse's knee as she sits opposite the surgeon.

The child's head is received by and grasped between the surgeon's knees. Under inspection by reflected light, for which in this inverted

position the forehead mirror is turned round on the surgeon's forehead, the mouth is opened by passing the handle of a teaspoon, held by the surgeon in his left hand, along the child's tongue, where it acts as a tongue-depressor during the subsequent manipulations. The surgeon then takes in his right hand a straight, narrow-bladed bistoury, guarded to within half-an-inch of its point, and passes it into the child's mouth, with its cutting edge directed towards the palate. Having been guided safely past soft palate and uvula, it is plunged into the swelling, and the puncture thus made is converted into an incision by extension upwards—that is, towards the palate.

All this is the work of a few seconds, but the important part of the operation is to follow. It consists in the nurse, when the surgeon gives the word, at once catching the child—it is usually a small infant—by the heels, and holding it upside-down until the abscess is emptied. The pus, unable to find its way into the larynx or trachea, flows freely from the mouth and nose. The nurse should be got to rehearse the manœuvre before the abscess is opened.

No after-treatment is necessary.

CHRONIC RETROPHARYNGEAL ABSCESS

Although this is a cold abscess of tuberculous origin, we are dealing with it now as it bears some resemblance to, and must be differentiated from, the acute retropharyngeal abscess we have just been considering. There are two varieties, the distinction of which in diagnosis is of capital importance. These are, first, the glandular, and secondly, the spinal.

Chronic retropharyngeal abscess of *glandular* origin is also of two kinds. First, that due to tuberculosis of the retropharyngeal lymphatic glands proper; and secondly, that due to tuberculosis of the cervical lymphatic glands, usually of the deep carotid chain on one or other side.

Tuberculosis of the Retropharyngeal Lymphatic Glands, short of softening and formation of cold abscess, is by no means uncommon when cervical glands elsewhere in the neck are the seat of the same disease. And not infrequently in the retropharynx, as in the neck, they break down and form a cold abscess. Most cases are found in children, but the disease is not unknown in adults.

Symptoms.—It happens sometimes that no symptoms are complained of, and that this particular incidence of the disease is unsuspected until the throat is examined, as it ought to be, of course, in all cases of tuberculous cervical adenitis. (See p. 87.)

Attention is, however, generally drawn to the disease—in children, at all events—by symptoms resembling those caused by adenoids: impeded nasal respiration, with snoring at night.

On inspection, the posterior pharyngeal wall of one side is seen to be bulging forward. If the gland or glandular swelling has broken down, or is beginning to break down, more or less of the mass will feel soft to the

touch. There is no pain and no rise of temperature. As a rule, tuberculosis of other glands co-exists.

Diagnosis.—The cold retropharyngeal abscess, from whatever lesion arising, is differentiated from acute abscess by the absence of fever and constitutional disturbance.

Tuberculous abscess of the retropharyngeal glands has to be distinguished from (a) tuberculous abscess of the carotid glands, extending inwards to the pharynx; and (b) from cold abscess due to caries of the upper cervical spine. The diagnosis is important from the point of view of treatment.

(a) When *tuberculous abscess of the carotid glands* is extensive, the collection may occupy a position extending from the outer planes of the neck into the retropharyngeal region. In such a case, in addition to fullness on one side of the posterior pharyngeal wall, there are signs of abscess on the same side of the neck, the collection coming to the surface under the skin usually posterior to the sterno-mastoid muscle.

On the other hand, tuberculous abscess of the posterior pharyngeal glands alone is limited to the pharynx.

(b) From *tuberculous abscess due to caries of the upper cervical spine*, tuberculous glandular abscess is distinguished by the absence of signs of rigidity as seen in the stiff carriage of the head; while X-ray examination, which in these cases should never be omitted, will probably reveal the presence of bone disease.

Treatment.—If the diagnosis is clear, tuberculosis of the retropharyngeal glands can be successfully treated through the mouth. The patient is anæsthetized and gagged. A stitch is passed through the tongue to hold it out of the mouth while, at the same time, a tongue-depressor holds its dorsum flat. The abscess is opened from below up with a bistoury carefully passed under inspection, and the caseous pus and *débris* is mopped away by gauze swabs on sponge-holders. When all the liquid material has been evacuated, a long-handled Volkmann's spoon is inserted through the mouth into the abscess-cavity in order to remove by curetting the tuberculous infiltration. This must be thoroughly done. Finally, the cavity, which is now of considerable size and thin-walled, may be filled with bismuth-iodoform paste, the excess of which is removed by gauze-pressure and mopping. As in all operations on the throat, the mouth must be cleaned beforehand. (See p. 54.)

This operation is very successful, but it may require repetition once or twice. In the meantime, the general treatment of the patient's disease should not be omitted.

When the retropharyngeal abscess extends from the pharynx to the cervical region, and is palpable in the neck, that is to say when it is due to carotid gland disease, it should be evacuated through an external incision.

The treatment of tuberculosis of the cervical spine lies beyond our province. If there is any suspicion that retropharyngeal abscess is due to spinal caries, it must on no account be evacuated through a pharyngeal

incision, as that would promptly lead to septic infection of the disease area in the bone.

CHRONIC PHARYNGITIS

is conveniently classified in three forms :

- (1) Simple chronic catarrhal pharyngitis ;
- (2) Chronic granular or hypertrophic pharyngitis ;
- (3) Atrophic pharyngitis, or pharyngitis sicca.

Chronic Pharyngitis results from any long-continued irritation of the pharynx. Exposure to dusty atmospheres or irritating vapours ; excessive tobacco smoking or chewing ; dental caries and pyorrhœa ; alcoholism ; dyspepsia ; anemia ; gout and rheumatism, are conditions which favour the production of the disorder, while occasionally it is set up by purulent nasal discharges, and not infrequently in adult life by the presence of septic tonsils.

Symptoms.—All forms of chronic pharyngitis are associated with discomfort in the throat—sometimes pain, more often soreness or rawness on swallowing, sometimes the feeling of a hair or a foreign body. An irritable, harsh cough, sometimes in prolonged paroxysms, often accompanies the paræsthesia, and the patient may complain of laryngeal disorders, such as hoarseness, quick tiring of the voice, etc.

On inspection, which is usually difficult by reason of the excessive sensitiveness of the throat, the whole of the pharynx—soft palate, uvula, tonsils and posterior wall—is seen to be uniformly congested. The uvula is frequently elongated and tremulous. Enlarged mucous glands dot the palate and pharyngeal walls, and streaks of sticky mucus are to be seen flaked about the surface. At the same time, behind each posterior faucial pillar one can often see a thick, red, hypertrophied band running up behind the soft palate, where, on endoscopy, it will often be seen to merge in a swollen posterior lip of the Eustachian orifice. This is sometimes called *pharyngitis hypertrophica lateralis*.

Granular Pharyngitis receives its name from the presence of small red granules or hypertrophied lymphoid clumps on the posterior pharyngeal wall. Granular pharyngitis is sometimes called "clergyman's sore throat," in which case the pharyngeal disorder is combined with laryngeal disability in the shape of vocal asthenia ; the need to "clear the voice" of frequently accumulating mucus ; and other irritating subjective phenomena, such as loud hawking and coughing in the morning.

Chronic pharyngitis in adult life is sometimes associated with the presence of septic tonsils, in which case the pharyngeal irritation may be secondary to tonsil infection.

Atrophic Pharyngitis or Pharyngitis Sicca is found in atrophic rhinitis and ozæna, and it is also induced when the inferior turbinates have been too much reduced in bulk by disease or operation.

The mucous membrane, especially of the posterior pharyngeal wall, is

dry, glazed, and bright red, bearing on its surface streaks of half-dried or wholly crusted mucus and muco-pus.

A variety of pharyngitis sicca occurs in diabetes, when it is associated with the dry, red, glazed tongue characteristic of the later stages of that disease. A similar appearance is also presented in moderately severe cases of scarlatinal pharyngitis towards the end of the first week.

Diagnosis.—The distinction between the different types of chronic pharyngitis and the discovery of the cause in any particular case is not always easy.

In the so-called *gouty* form, that is to say, in that variety of chronic pharyngitis so common in bulky men of middle age, which is the expression of a lack of balance between the intake of highly nutritious and stimulating food and drink and its excretion or utilization in muscular work, the redness of the congested pharynx often possesses a livid tone, while the edges of the uvula and of the faucial pillars and arches may be semi-translucent from slight œdema. But it is from the history and general aspect of the patient that most information is obtainable. (The urine should always be examined.)

In these cases the tonsils usually share in the general congestion, but their removal is inadvisable, as at the best only temporary relief is thereby afforded to the symptoms, whereas if the general dyscrasia is efficiently treated, cure of the pharyngitis will follow spontaneously.

Treatment.—Endeavours should be made to ascertain and treat the cause of the disease. Nasal disease, adenoids, septic tonsils and dental disease are among the commoner causes, and after them comes over-indulgence in tobacco, alcohol and rich food, all of which should be reduced. At the same time, a weekly or bi-weekly dose of calomel or blue pill followed by a saline purgative will often work wonders in allaying pharyngeal congestion and discomfort.

While the underlying cause is thus being remedied, the application of the following, in the form of throat-paints, is serviceable: liq. ferri perchlor., ʒj to ʒj of glycerine; zinc chlorid. gr. xx, or argent. nit. gr. xx, to ʒj of equal quantities of glycerine and water. The old-fashioned garg. ac. tannic. is still popular.

Lozenges of various kinds are favourite remedies for the relief of cough, dryness and irritation of the throat. Their number and variety are many, but probably they owe their usefulness chiefly to the free salivary secretion induced by their sugary constituent.

Galvano-cautery puncture has a place in the treatment of granules when they are present, as well as in that of the thick vertical bands of lateral hypertrophic pharyngitis. Under local anæsthesia, the platinum needle at a bright red heat is inserted into the centre of each granule, or in a series of punctures along the lateral band. The point of the needle should pass through the mucous into the submucous layer, stopping short of the muscular coat. It is when paroxysmal cough is a prominent symptom that the cautery is of most value, but as it has little or no effect in reducing the

general congestion, and may, in fact, subsequently increase the feeling of irritation, it ought to be but sparingly employed. In any case, the use of the cautery should be subordinated to the all-important treatment of the prime cause of the pharyngitis.

ELONGATED UVULA

In chronic pharyngitis, from whatever cause arising, the uvula frequently undergoes lengthening, and may also become generally hypertrophied, broadened and spade-like, in association with the inflammation and congestion of the soft palate.

The *symptoms* arising from the uvula are a sense of fullness and obstruction in the throat and sometimes an incessant tickling cough, especially when the patient is lying down. The cough is obviously due to irritation of the glosso-epiglottic region, which is also known to proceed so far as to produce spasm of the glottis. In many cases the long uvula causes no symptoms whatever.

On examination, the uvula is seen to be resting on the tongue during quiet respiration, and on phonation, as it is tucked up by the azygos uvulæ muscle, the mucous membrane covering it is thrown into spiral folds.

Treatment, which is reserved for cases where it is really necessary, is by uvulotomy.

Under cocaine anæsthesia the tip of the uvula is seized with a pair of uvula forceps and held, but not pulled forward, while with uvulotomy scissors, or with ordinary scissors curved on the flat, the tip and as much of the body as is redundant is cut off in an upward and backward direction, so as to leave the wound on the posterior surface. Hæmorrhage is slight. If it should continue, the raw surface may be touched with the galvanocautery at a dull red heat.

A simple antiseptic gargle is all that is needed for after-treatment.

CHRONIC HYPERTROPHY OF THE TONSILS (ENLARGED TONSILS)

Ætiology.—Enlarged tonsils are usually associated, in children at all events, with adenoid vegetations in the naso-pharynx; indeed, in children it is rare to find enlarged tonsils without adenoids, while it is by no means unusual to find adenoids without enlarged tonsils. Moreover, adenoids of sufficient bulk to cause symptoms are found at an earlier age than enlarged tonsils. That being so, it is reasonable to assume that in addition to nasal infection, naso-pharyngeal infection also tends to cause enlargement of the tonsil. (See also p. 390.)

The tonsil is an exposed lymphatic gland, and its enlargement is almost certainly due to chronic infection. Further, the enlargement is not limited to the tonsil; it affects also the adjoining lymphatic glands. Of 170 cases of hypertrophied tonsils examined by the writer, in only three cases could no enlarged glands be felt in the neck; in twenty-two the glands were

noted as being "large," and in twenty-two enlarged nodes were also felt in the posterior triangle of the neck. Those most frequently enlarged belong to the superior group of lymphatic glands of the deep cervical chain, and can be felt just behind the angle of the jaw. Thus the enlarged tonsil is merely one of a chain of hypertrophied masses of lymphoid tissue, a chain which, in childhood at least, usually includes the adenoid vegetations of the naso-pharynx. (For further discussion on the ætiology of hypertrophy of the tonsils and adenoids, see p. 390.)

In adults, enlarged tonsils are frequently found without any adenoids in the naso-pharynx, but as a rule they date from childhood, and have probably therefore been associated with adenoids to begin with.

Pathology.—Simple chronic enlargement of the tonsil is due, primarily and essentially, to a hypertrophy of the lymphoid tissue constituting the gland; but as the local resistance of this hypertrophied tissue to the inflammatory effect of septic bacteria is low, the organ is liable to inflammatory changes, both acute and chronic, with the result that it tends to become more and more permeated by fibrous tissue as the patient grows older. There is, however, considerable variation in the amount of fibrosis present at any time, and although as a rule old tonsils are more fibrotic than young tonsils, nevertheless many remain soft and friable even in adult life. Among other changes due to fibrosis we may mention closure of the orifices of the crypts, whereby cysts are formed, the contents of which may become calcareous. There is one normal change in the direction of fibrosis which is common to all tonsils, whether large or small, and that is a thickening of the capsule, which, fine and membranous in childhood, becomes dense, thick and white in adult life.

According to W. G. Howarth and S. R. Glogner, septic bacteria are present on the surface, in the crypts, and also within the substance of all tonsils. But the organisms are not always pathogenic.

If enlarged tonsils are not removed by operation, they in the course of time gradually become smaller, until by the time adult age is reached they have lost much of their bulk, although they often retain much of their power for evil. But this reduction in bulk is very irregular. In many cases they seem to get larger with increasing years, while in others they remain unaltered in size. In adult life the virulence of a tonsil is estimated, not by its bulk, but by its effects. In childhood one judges more by the size, perhaps, when operation is being discussed, save, of course, in the case of tuberculosis (*q. v.*).

Symptoms.—In children, hypertrophied tonsils by their bulk and prominence add to the burden of adenoids by impeding buccal respiration, just as adenoids impede nasal respiration. That this is the case was shown by the frequent disappearance of the symptom of snoring, which, in older times, before adenoids were discovered, followed when the tonsils alone were reduced.

Further, enlarged tonsils are septic tonsils, and so these patients, both children and adults, are subject to recurrent tonsillitis and pharyngitis;

to acute rheumatism with its sequelæ, endocarditis and chorea; more rarely, to acute nephritis; and even, it is said, to appendicitis and other forms of gastro-intestinal sepsis. Lastly, enlarged or septic tonsils share, with carious teeth, the reputation of presenting an ever-open door for the admission of tubercle bacilli, which, passing to the neck, lead to glandular tuberculosis. (A. P. Mitchell.)

Consequently, patients with those diseases, as well as patients who are subject to recurrent attacks of "sore throat," "tonsillitis," and "quinsy," should be examined with the view of ascertaining whether or not the tonsils may be the cause of their ill-health.

In addition, we must also mention that in certain systemic and other diseases, among which are rheumatoid arthritis, certain affections of the eyes, such as irido-cyclitis, and (doubtfully) some forms of goitre, toxic absorption from the tonsils seems, at times, to be a powerful agent in the causation, even when they are, to all appearance, normal in size and in behaviour.

On *inspection* hypertrophied tonsils are usually quite evident. If a tonsil projects from behind the anterior pillar of the fauces, its size should be regarded as abnormal. But it is frequent to find a large tonsil so hidden by a broadened or distended faucial pillar that it is entirely invisible. This is known as a "buried tonsil." But although the tonsil is thus hidden, its bulk so narrows the isthmus of the fauces that there need be no difficulty in recognizing its presence. Occasionally, however, the part of the tonsillar body most hypertrophied is the lower segment, and, as this lies below the level of the dorsum of the tongue, it may escape observation, not only in the ordinary routine examination of the throat, but, what is more important, it is liable also to escape notice at the time of operation. Hence, the tongue should always be well depressed, and it is also a good plan to induce gagging or retching at some part of the examination, as this act turns the inner aspect of the gland obliquely towards the mouth, so that we get a complete view of the whole tonsil.

Diagnosis.—In adults the progressive enlargement of one tonsil raises the question of sarcoma (*q. v.*). And in lymphadenoma (Hodgkin's disease) that disease frequently commences with an enlargement of the tonsils, bilateral in this case. Lymphatic leukæmia also is sometimes associated with enlargement of the tonsils beginning in adult life (Sir StClair Thomson). But in those diseases the surface of the gland is smooth, while the colour is usually paler than in simple hypertrophy. In any case of doubt, the microscope must be resorted to for diagnosis.

Treatment.—(1) When the tonsils are enlarged in a case of adenoids; (2) when they obstruct respiration, interfere with speech, or cause persistent cough; (3) when there is recurrent tonsillitis or quinsy; (4) when the tonsils are suspected of causing rheumatism, rheumatoid arthritis, chronic pharyngitis or other disease, then they require treatment. The only treatment worthy of the name is operation, and in modern times the operation practised is total and entire removal of the gland—what is variously termed *enucleation* or *tonsillectomy*.

It should be noted also that when there is tuberculosis of the cervical glands, the tonsils must be entirely removed, and in this disease they should be removed whether they are enlarged or not.

THE REMOVAL OF TONSILS

may be performed by one of two methods, namely : first, *enucleation by the guillotine*, which is the operation of choice in children ; and secondly, *tonsillectomy by dissection*, which is the operation of choice in adults.

Tuberculosis again furnishes an exception to this rule. In tuberculosis the tonsils should invariably be dissected out, whether the patient is young or old.

The *preparation* is the same for both operations, and indeed for all operations about the throat, naso-pharynx, nose, and larynx. Consequently they will now be detailed once and for all.

Cleanse the mouth.—If there are any carious teeth, alveolar abscesses, or pyorrhœa alveolaris, the dentist must be employed to remove or minimize these complications. If this is not done, the operation wound in the throat is liable to become septic. After extraction of the teeth, the throat operation should not be performed until the dental wounds are healed.

After each meal for two or three days preceding operation, the patient is made to rinse the mouth, brush the teeth, and gargle the throat with a mild antiseptic mouth-wash, such as lysoform in Aq. 1 per cent.

The hypodermic injection of “coagulen-ciba” once or twice before the operation may be tried, with the object of minimizing hæmorrhage.

The other preparatory measures are the same as those for any other surgical operation.

The Guillotine Operation (Whillis and Pybus), as practised in children under puberty, will first be described.

Anæsthetic.—Open ether, chloroform or ethyl chloride. Whichever is employed, the patient is first of all anæsthetized, and then the operation is performed with the anæsthetic mask off. A second administration is seldom necessary, as the anæsthesia is sufficiently prolonged for both the tonsil and the adenoid operation.

Position.—In hospital practice with a large *clientèle* the sitting position enables the nursing staff to handle the cases quicker. A very stout chair is necessary, into which the patient is secured by a strap across the upper thighs. The surgeon, wearing his mirror, sits in front of the patient, as in the ordinary examination. The anæsthetist, standing behind the chair, leans over the patient's head, and administers ethyl chloride from that position. The tray of sterilized instruments lies on a table at one or other side of the surgeon. Kneeling on the floor by the patient on the side opposite to the instrument table is an assistant nurse, while the chief nurse looks after instruments and surgeon's requirements.

Performed in this manner, the operation can be accomplished with perfect efficiency, but “team-work” is called for, and unless all the

co-workers are trained, it is much more satisfactory to operate on the patient lying flat on an operating or other suitable table.

In the same way, unless the anæsthetist is an expert, open ether or chloroform is preferable to ethyl chloride.

With the patient in the horizontal position many operators advise that

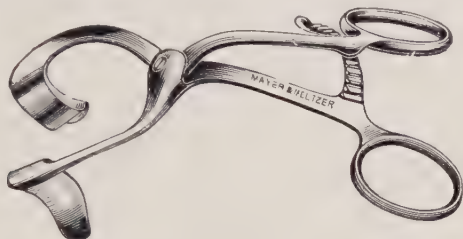


FIG. 8.—Doyen's Gag.

the head should be lowered during operation so as to hinder the ingress of blood into the larynx and air-passages. The writer, on the other hand, often operates with the patient on an inclined plane, from head to feet, the head and shoulders being raised. In this position the hæmorrhage is less free.

With the patient lying on the table, the surgeon stands on the right,

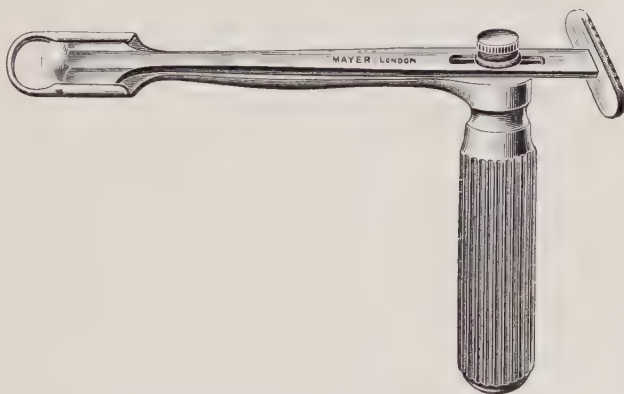


FIG. 9.—Heath's Reinforced Tonsil Guillotine.

the anæsthetist at the head ; opposite the surgeon is his assistant, surgeon or nurse ; while the lamp is placed at the corner of the table between anæsthetist and assistant. A fourth pair of hands takes charge of sponges and sponge-holders.

It is assumed that the strict ritual of aseptic surgery is followed. Operator and nurses wear sterilized gowns, gloves and masks.

Instruments.—Doyen's mouth-gag (Fig. 8) ; Fränkel's tongue-depressor (Fig. 17) ; half-a-dozen George's sponge-holders with marine sponges (gauze

swabs are not recommended, as they are apt to tear the tissues and so to increase bleeding); Heath's reinforced tonsil guillotine, which should be carefully *blunted* (Fig. 9); several pairs of pressure forceps, and two or three pairs of tonsil hæmostatic forceps (Fig. 23). (For adenoid operations see p. 395.)

Manipulation.—The mouth is propped open with Doyen's gag. It is better to remove the *right* tonsil first. There are two methods of using the guillotine.

Method No. 1 (Fig. 12).—Holding the guillotine in the left hand, and with the handle turned to the patient's right, pass the eye of the instrument over the right tonsil. Carry the shaft of the instrument to the opposite angle of the patient's mouth, and press the tonsillar end of the instrument very firmly outwards. At the same time pass the forefinger of the *right* hand into the patient's mouth, and apply it to the lower rim of the eye of the guillotine as it lies embracing the tonsil, and with this finger aid the forcible pressing of the guillotine around the tonsil. Then with the thumb of one or other hand, slowly push home the guillotine blade. Turn the

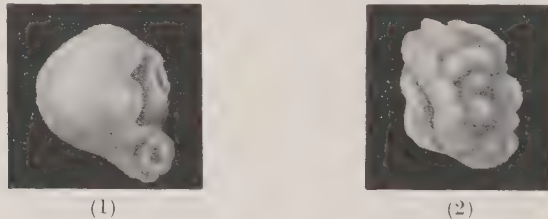


FIG. 10.—Tonsil of Child Enucleated by Guillotine.

1. In the natural state, the tonsil capsule enclosing the gland like a hood.
 2. In the extroverted state, with the gland substance extruded and the capsule reflected
- Compare with Fig. 12.

guillotine flat (*i. e.* with the plane of its broad surface parallel with the plane of the dorsum of the tongue), its handle being brought round so as to lie pointing downwards (*i. e.* towards the patient's chest), and withdraw from the mouth. The tonsil comes out fixed in the guillotine. Re-open the guillotine, and deal with the left tonsil in the same manner, substituting left for right in the manipulation.

Method No. 2.—To remove the *right* tonsil, grasp the guillotine in the right hand, with the handle pointing towards the patient's left. Pass the guillotine into the right tonsillar region from the left angle of the mouth. Pass the eye of the guillotine over the right tonsil. (*Note.*—The guillotine now occupies a position relative to the tonsil the reverse of that described in No. 1.) Press the eye forcibly outwards, and while doing so apply the forefinger of the left hand against the anterior pillar of the fauces so as to push the buried part of the body of the tonsil into and through the eye of the guillotine. While this manœuvre is being accomplished, slowly push

home, with a disengaged thumb, the blade of the guillotine. Finally, turn the guillotine flat as in method No. 1, but with the handle pointing upwards to the patient's forehead, and withdraw. Re-open the guillotine, and deal with the left tonsil in the same way, with left for right.

In *both methods* the object of the manipulation of the guillotine is to extrovert the mass of the tonsil body through the ring of the guillotine (see Fig. 12), and when this is successfully accomplished, the tonsil is removed in the extroverted state, entire, and with its capsule intact. (See Fig. 10.)

In *both methods* the object of the manipulation is facilitated if, after the guillotine is accurately and firmly applied, the instrument and its contained tonsil are pulled a little forward so as to cause the tonsillar region to ride, as it were, on the adjacent bone of the inferior maxilla.

Finally, in *both methods* a blunt is better than a sharp guillotine, as the latter tends to slice through the tonsil instead of following the capsule. A sharp guillotine, moreover, causes more bleeding.

Many surgeons, among whom is the writer, after closing the blunt guillotine-blade fully, keep up pressure for a couple of minutes or so before removing the tonsil, in order to lessen the bleeding (Fig. 11.) In this modification the tonsil is often avulsed, and J. B. Horgan advises it also for adult tonsils.

There are several ingenious crushing guillotines on the market.

Whichever method be adopted, the tonsil should immediately after removal be scrutinized to see that its capsular surface is smooth and intact. (See Fig. 10.) If it is not, the guillotine is re-introduced as before and the manipulations are repeated, and so on until the whole tonsil is removed.

Before proceeding to remove the second tonsil, sponge and inspect the wound made in removing the first. Pass a sponge-holder with its sponge into the raw tonsil fossa and keep up firm pressure for a minute or two. If bleeding is slight or absent proceed to remove the second tonsil. If not, take measures to arrest the hæmorrhage. (See p. 65.)

Repeat the inspection after removing the second tonsil.

Adenoids, if present, are now removed. (See p. 395.)

Before returning the patient to bed make sure that the bleeding is stopped. If it is still continuing, the anæsthesia must be prolonged and the bleeding points secured.

Difficulties.—The knack of guillotine enucleation can only be acquired by practice. There is a risk of button-holing, or of removing the anterior faucial pillar in pushing home the blade of the guillotine, but with complete extroversion this can be avoided. If, however, a button-hole has been

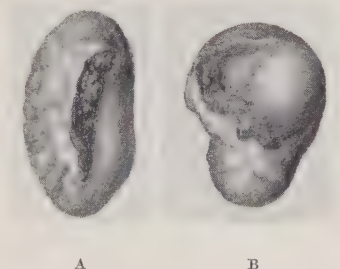


FIG. 11.—Tonsil Removed after Preliminary Crushing.

A. As removed. B. Capsule re-placed over tonsil.

made, it can be easily closed by passing a stitch from one side of the gap to the other so as to draw its edges together.

Extroversion is most difficult in old fibrous tonsils, and these, though commonest in adults, are sometimes also found in older children. The fibrous tonsil, if guillotined, is very liable to bleed.

After-treatment.—The patient is laid in bed, with the head and shoulders well raised, and kept during the first 24 hours on one side, with the face turned over and downwards (William Hill), pillows being adjusted to



FIG. 12.—Guillotine Enucleation of the Tonsil.

Extroversion through the eye of the guillotine is completed and the blade is closing.
Compare with Fig. 10.

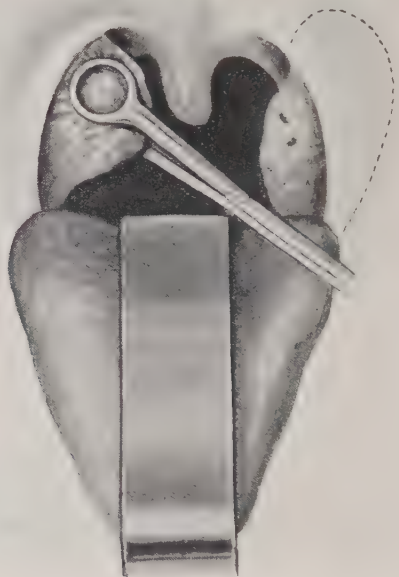


FIG. 13.—Tonsillectomy by Dissection.

The opening is made parallel to the edge of the anterior pillar of the fauces through the pale line produced by the pressure of the buried part of the tonsil when pulled out with the forceps.

maintain the position. In this attitude blood from the throat tends to come into the mouth or nose, and to be ejected. If, on the other hand, the patient is left lying on the back he may bleed to death into his stomach.

Give instructions to the nurse to keep all vomited material during the first 24 hours, and to report if the patient is vomiting blood at frequent intervals, as blood accumulating in the stomach usually acts as an emetic, and frequent hæmatemesis is thus an indication that the hæmorrhage in the throat is continuing. The surgeon should himself visit the patient not later than two hours after the operation, in order to intervene if hæmorrhage is proceeding.

During the first twenty-four hours the patient suffers considerable pain in the throat, especially on swallowing. But otherwise the condition is not uncomfortable, and shock after operation is rare.

The best local application after operation is a spray of sol. hydrogen peroxide (10 vols. per cent.) every few hours directed on to the tonsil wounds. The food should be restricted to slops until the patient can chew and swallow easily. He should be kept in bed for three days, and indoors for a week.

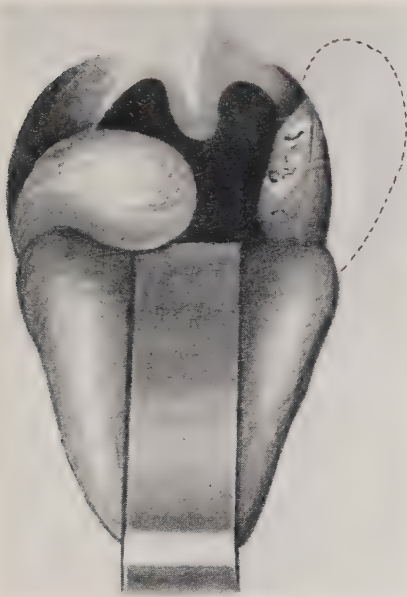


FIG. 14.—Tonsillectomy by Dissection.

The tonsil has been dissected out of its fossa and is lying on the tongue, still attached by its lower pole.

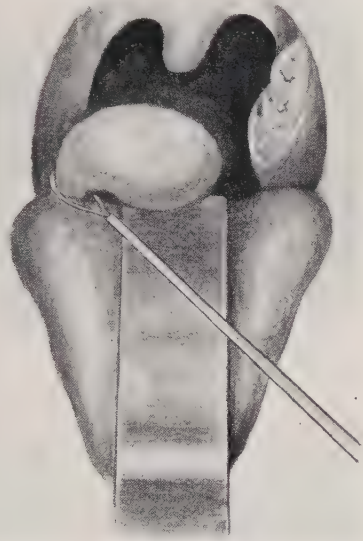


FIG. 15.—Tonsillectomy by Dissection.

The snare passed to sever the last attachment.

Tonsillectomy by Dissection is a more severe operation than enucleation with the guillotine; the risks of sepsis are greater; and the subsequent scarring is more deforming to the fauces and palate. But it is preferred by the author for adults, because it is difficult to enucleate old tonsils with the guillotine. There are, however, many operators who guillotine the adult tonsil, just as there are some who, on the other hand, prefer dissection at all ages, in children as well as in adults.

The preparation of the patient and the position at operation are the same as at the former operation.

Anæsthesia.—Prolonged anæsthesia, in the surgical stage, is necessary, and for this reason ether with chloroform is usually employed. The administration should be preceded in adults by gr. $\frac{1}{8}$ morph. hydrochlor. with gr. $\frac{1}{100}$

atropine hypodermically, in order to calm the patient and to reduce the secretion of saliva and mucus.

In adults the tonsils may be removed under *local anæsthesia*.

Method.—The patient's fortitude will be strengthened if we allow him a light meal an hour or two before we begin work. The advisability of coming to operation with an empty stomach, so important for general anæsthesia, does not hold good for patients undergoing local anæsthesia. Half an hour before the anæsthetic is begun, the patient should be given a hypodermic injection of morphia (gr. $\frac{1}{8}$ to $\frac{1}{3}$) and atropine (gr. $\frac{1}{100}$) to reduce reflex irritability and mucous secretion and to soothe apprehension. The surgeon and patient are seated face to face as in the examination chair, the surgeon wearing a headlight or forehead mirror.

The induction of the local anæsthetic may be divided into two stages : (1) Surface swabbing, and (2) deep infiltration.

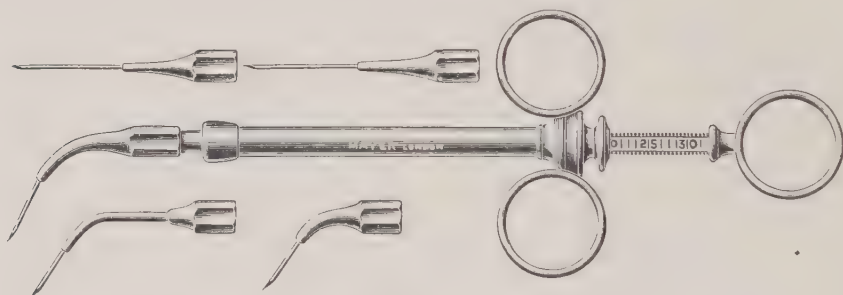


FIG. 16.—Syringe and Needles for local anæsthetization of throat.

Surface Anæsthesia.—A mixture in equal quantities of solutions of cocaine (10 per cent. in water) and of adrenalin (1-1000) is used. The adrenalin is added more with the object of intensifying the local action and minimizing the absorption of the cocaine than with the object of reducing hæmorrhage. By means of cotton-wool throat-swabs this anæsthetic mixture is applied, punctiliously and methodically, to the base of the tongue; the faucial pillars on both sides; the uvula and soft palate, including their hidden surfaces; the posterior pharyngeal wall; and, very particularly, to the surfaces of the tonsils themselves. During the application the patient should be warned not to swallow any of the solution, but to clear his throat and to spit out any excess into a basin on his knees. The swabbing has to be repeated three or four times before the pharyngeal surfaces become sufficiently insensitive to permit us to pass on to the second stage—

Deep Anæsthesia by infiltration of the tissues in which the tonsil lies embedded. For this purpose the syringe and needles here figured (Fig. 16) are recommended.

For the infiltration cocaine is not employed. Neither is adrenalin.

The toxic action of the former is too great, while the use of the latter is apt to be followed shortly after the operation by a reactionary capillary hæmorrhage which is difficult to control. What we generally employ is a 5 per cent. solution of novocaine in water, and it is a wise precaution to have the cocaine mixture removed out of reach while the injections are being given, so as to prevent the syringe being accidentally charged with the toxic solution.

The syringe filled with the novocaine solution is fitted with a bent needle, which is inserted at the point marked on the anterior pillar of the fauces in the diagram (Fig. 17). Here the mucous surface is separated from the underlying capsule of the tonsil by a very shallow layer of submucous tissue, and it is this layer that the anæsthetic must be made to infiltrate.

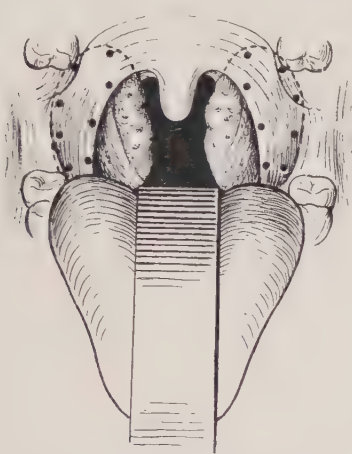


FIG. 17.—Local Anæsthesia for Tonsillectomy. Points of infiltration.

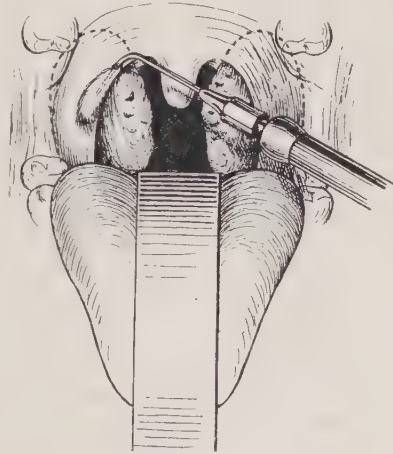


FIG. 18.—Local Anæsthesia for Tonsillectomy. Infiltration of anterior pillar of fauces. The dotted line indicates the submerged boundary of the tonsil.

The point of the needle, then, having entered this submucous layer through the mucous membrane, is passed downwards (or upwards) as far as it will go. It is then slowly withdrawn, and during its withdrawal the solution is ejected, ballooning up the submucosa till it comes to look like a bleb or blister. (See Fig. 18).

In this act it is necessary to avoid puncturing the capsule of the tonsil, or the novocaine solution will be syringed into the tonsil, and passing out into the pharynx by way of the crypts it will be lost.

One or two insertions of the needle along this line are usually necessary, and the uppermost should be situated just above the superior pole of the tonsil, and that extends much higher into the palate than might be supposed. (See Fig. 17.) If the surface has been properly anæsthetized by the previous swabbing, these pricks will not be felt. After this manner both anterior

and posterior faucial pillars are infiltrated throughout their entire extent. A few injections must also be made through, as well as into the substance of, the lower pole of the tonsil close to the tongue.

If the pharyngeal reflex is very lively, a few drops of the solution in the larynx has a good effect.

Then the curved needle having been removed from the syringe and a straight one fitted on to it, we proceed to the infiltration of the pharyngeal tissues around and outside of the capsule of the tonsils. Here one is very liable to go astray, for the tonsil is much more deeply embedded than it looks, and if the anæsthetizing needle is plunged into the tissues without allowance being made for the dimensions and anatomical relations of the gland, it will (as before) penetrate the capsule of the tonsil and the solution will be lost. On the other hand, if the needle is passed too much laterally, the deep regions of the neck will be penetrated—an accident which may set up deep cervical cellulitis subsequent to the operation.

The surest mode of ascertaining the hidden geography of these parts is to palpate with the tip of the finger the anterior pillar of the fauces and the soft palate. The firm feel of the underlying tonsil is unmistakable, and its limits can in this way be clearly defined. Three of these deep injections are made along the curved line (indicated by the outer row of dots in Fig. 17), and success in reaching the proper space is indicated when we see the whole of the tonsil raised by the bulk of the injection in such a way as to stand out more prominently in the pharynx. This completes the stage of anæsthetization. But before beginning his operation the surgeon should wait several minutes in order that the anæsthetic may have sufficient time to take effect—an interval which can be profitably occupied in once again painting the surfaces of the pharynx with the cocaine solution.

Throughout these all-important manipulations anything like haste should be avoided. A hurried anæsthesia is an imperfect anæsthesia.

Manipulation.—In patients under a general anæsthetic the mouth is widely opened with a Doyen's gag. A stitch of silk is passed through the tongue, and left in, the ends of the thread being grasped by a pair of pressure-forceps. These are given to an assistant to hold, and he, by their means, keeps the tongue out of the mouth during the course of the operation.

The face is turned in such a way that the head lies more or less on its right side while the right tonsil is being operated on, and towards the left when the left tonsil is being operated on.

When the operation is performed under local anæsthesia, the patient is usually seated, facing the surgeon, and the method controlling the mouth and tongue as detailed above is unnecessary.

The tonsil is seized by Seccombe Hett's forceps, and pulled towards the opposite angle of the mouth. This makes the buried body of the tonsil bulge out the anterior faucial pillar. (See Fig. 13.) With the author's tonsil separator (Fig. 19), or some such instrument, the mucosa over this bulge

is incised or scraped through until the tonsil capsule is exposed at its buried upper and anterior part. With a blunt tonsil dissector, or with a pair of curved scissors, closed, the capsule bearing its tonsil is rapidly freed from its loose attachments until the gland can be dislocated out from its bed

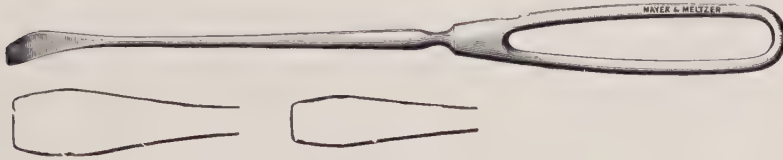


FIG. 19.—The Author's Tonsil Knife.

on to the tongue. (See Fig. 14.) In this act it may be necessary to snip with the scissors the connection of the gland with the upper part of the posterior pillar of the fauces. The tonsil is now attached by its lower pole only, but as this attachment is firm, and, indeed, partly composed of muscle-fibres from the superior constrictor of the pharynx, it cannot be got through by blunt dissection.

At this stage the guillotine may be threaded over the partially detached tonsil, and this last band of union cut with the blade of the guillotine. But the author advises Lermoyez's wire snare (Fig. 21) for the final act of severance, as it is less liable to be followed by bleeding. (Fig. 15.) The tonsil forceps are first of all passed through the loop of the snare, and both instruments are conveyed to the pharynx. The forceps grasp the semi-detached tonsil, and pull it through the loop of snare-wire, which is thereupon tightened. See that the uvula is not included in the wire-loop.

Take care before giving the final turn to the snare that the strangled tonsil is caught by a pair of forceps—Tilley's forceps are useful at this stage—to prevent the severed gland being lost in the pharynx. After the tonsil is thus removed, mop the raw surface left with a sponge, and look for bleeding points. (For bleeding, see later.)

The bleeding stopped or negligible, turn to the other tonsil, and deal with it likewise.

Tonsillectomy with the Davis gag.—As will be seen from the figure (20), this is a method of semi-suspension, so to speak.

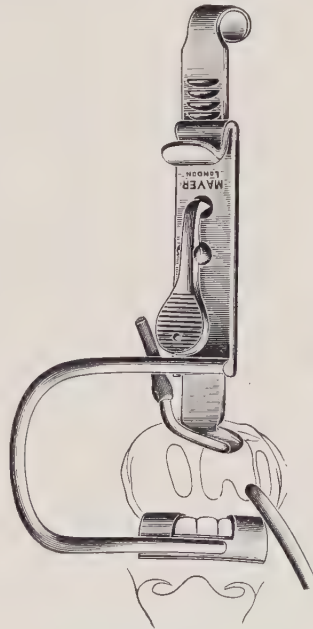


FIG. 20.—The Davis Gag.

A general anæsthetic is employed, and after anæsthesia is complete, the closed gag, fitted with the tongue-spatula of the size suitable to the patient, is slipped into the mouth over the tongue, adjusted to the incisor teeth, and after being opened as wide as possible, is given to the anæsthetist or to an assistant to hold. The anæsthetist attaches his delivery tube to the apparatus and continues administering his anæsthetic through it. The surgeon is seated at the head of the table in much the same position as when the patient is suspended. (See Fig. 103.) The head of the patient should not, however, be fully extended, but only so much, by a pillow under the shoulder and the nape of the neck, as to bring the tonsillar region fully into view. The lamp is placed at one or other side of the operating table with its beam directed on to the operator's mirror. The operation proceeds as already detailed. In this position, of course, the field of operation is upside down.

The advantages of this method of operating are as follows: (1) The view is less impeded and interrupted by tongue and other movements. (2) Anæsthetization is continuous and is unhindered by the surgeon's manipulations. (3) Blood runs into the naso-pharynx and nose, and is less likely to reach the larynx and trachea. (4) Bleeding points are quickly seen and easily caught, as the field of operation is nearer to the operator and his access is unobstructed.

The awkwardness of dissecting out the tonsil in the upside-down position is soon overcome by practice, and, if over-extension is avoided, the bleeding is no more profuse than in the ordinary position.

Difficulties.—Tonsillectomy by dissection is not an easy operation, and should not be undertaken lightly. The inexperienced are prone either to remove too little or too much, and the risks from hæmorrhage are considerable.

It is a curious fact that pedunculated movable tonsils are more difficult to dissect out than buried tonsils are. In the case of the former the capsule of the upper part of the tonsil may be most easily reached and exposed by first of all inserting the author's tonsil-separator (Fig. 19) between the anterior pillar of the fauces and the body of the gland, sweeping it up and down so as to sever the attachment of the tonsil to the pillar. This manipulation is most easily carried out if the tonsil is not grasped and drawn out of its bed by forceps—at all events until the separation has been effected.

In this modification of the operation the separation of tonsil from pillar by means of the separator does away with the necessity of making the incision described above through the anterior pillar of the fauces.

Difficulty is also experienced when the tonsil is soft and friable, as the forceps grasping it are constantly tearing out and losing their hold. In such cases seize the capsule itself as soon as it is exposed, and no more trouble will be encountered from that source.

The separation of the tonsil should be made as close on to the capsule as possible in order to avoid undue trauma of the constrictor.

Tough bands of fibrous tissue attaching the capsule to the deeper parts

are often met with in cases which have had quinsies. They are usually avascular, and should be snipped through with the scissors.

Sutures.—The wound left by the operation often extends as high up into the soft palate as the base of the uvula. To minimize subsequent

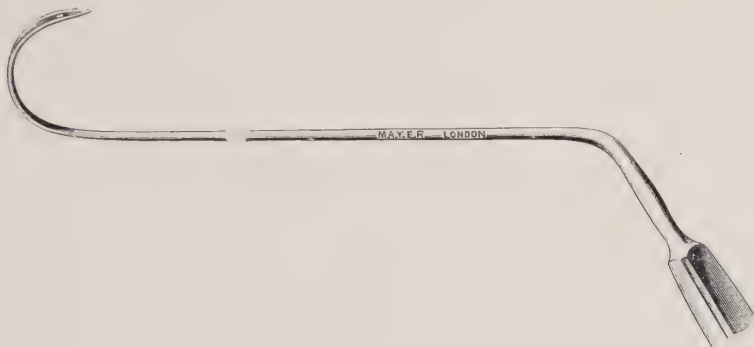


FIG. 21.—The Author's Tonsil-Needle.

cicatricial contraction it may be closed at this spot by a suture of silk inserted by means of the tonsil-needle (Fig. 21) ; the suture must be removed a couple of days after the operation or it will cause ulceration and increase the scarring. Some operators make a practice of suturing the entire wound

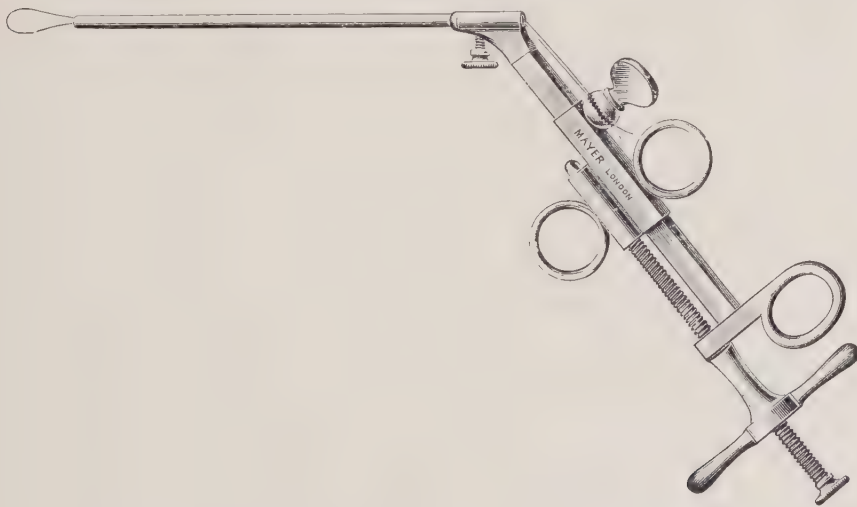


FIG. 22.—Lermoyez Tonsil Snare. (Wire with No. 9 or 10 ; English gauge.)

from top to bottom in all cases. The writer does not recommend this practice even for the control of hæmorrhage.

Hæmorrhage.—The ordinary capillary and venous bleeding from the operation-wound can usually be stopped by sponge-pressure continued

for several minutes. Some operators apply chemical styptics such as zinc chloride (gr. 30 to 3j of water); tannic acid; liquor ferri perchlor. and so on. (Adrenalin should not be employed for this purpose, as reactionary hæmorrhage may set in after its use, and may be very difficult of control.)

If, after the pressure has been continued for a few minutes, inspection shows that the hæmorrhage has not come to a standstill, search should at once be made for the bleeding vessel or vessels. Bleeding from such vessels, whether they be arteries or veins, is apt to be mistaken for general capillary oozing.

In most, the bleeding point lies in the upper pole of the wound, concealed by the soft palate as by a hood; sometimes, again, the point is situated on the raw posterior aspect of the anterior faucial pillar, where it can be

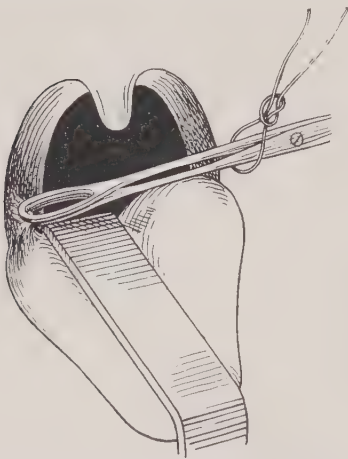


FIG. 23.—Ligature of Bleeding-point after Tonsillectomy. (For knot see Fig. 24.)

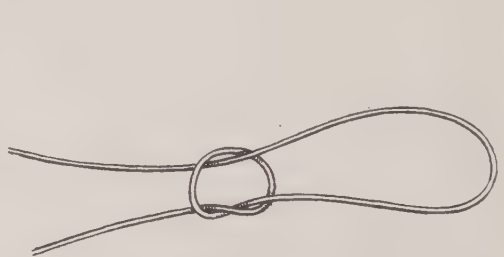


FIG. 24.—Detail of Slip-knot for Ligature after Tonsillectomy.

(The knot itself is tightened, though the loop is left, before application.)

seen on turning the pillar round; thirdly, a vessel in the bed of the wound about its centre occasionally causes trouble; and finally, free and continued hæmorrhage may proceed from the lower end, where the wound impinges upon the base of the tongue. Any one, or any combination of those points, may be the source of the hæmorrhage.

A large variety of hæmostatic forceps have been specially devised for seizing bleeding vessels in the tonsil wound. The writer considers the round-nosed, fenestrated forceps here figured (Fig. 23) to be better fitted than any to catch up quickly a bleeding point or area anywhere in the tonsil wound. With them, given good light and good anæsthesia, even concealed vessels can be secured. After the bleeding point or points have been caught and the bleeding thereby controlled, a ligature or ligatures should at once be applied.

On a strand of fresh plaited silk an open slip-knot is made (Fig. 24),

the loop of which is passed over the handle of the hæmostatic forceps, closed to fit the shaft of the forceps, and slid up to their end by means of a pair of dissecting or simple pressure forceps. The loop is then guided over the round end of the hæmostatic forceps, and, with a steady, un-deviating pull is tightened—at first gently, to make sure the loop is free of the end of the forceps, and then more forcibly, so as to encircle and constrict the tissue gripped by the hæmostatic forceps.

As the surgeon is thus tightening the loop of the ligature, an assistant takes hold of the hæmostatic forceps, pulling them out a little and with them the tissue they are gripping, so as to facilitate the application of the ligature to that tissue. Then, as the surgeon, feeling his ligature “bite,” gives the word, the assistant cautiously releases the catch of the forceps, opens them, and removes them.

A little practice is necessary before one becomes expert at this manœuvre, and it is a wise plan to practise ligaturing even small bleeding points in the tonsil-wound in order to acquire the requisite skill and celerity. Thereafter, the surgeon, confronted with really brisk tonsil hæmorrhage, will no longer feel even slight animation.

It is advisable to arrest all the bleeding in one tonsil wound before proceeding to remove the other tonsil.

Make sure that all tonsil bleeding is stopped before the patient leaves the operating table. To leave the control of hæmorrhage to Nature is, after all, to relinquish one's duty as a surgeon. It is, in a word, unjustifiable, and has been responsible for many preventable fatalities.

Reactionary Hæmorrhage.—As a rule what is called reactionary hæmorrhage is merely hæmorrhage prolonged after the operation—that is to say, hæmorrhage which the surgeon has failed to check at the operation. It may be, perhaps, sometimes difficult to make sure at the operation that hæmorrhage has actually ceased.

At all events, if not discovered until after the patient has come round from the anæsthetic, ice should be given to suck, and the patient's head and shoulders raised. If this fails, we have to decide, when both tonsils and adenoids have been removed, which area it is that is bleeding. Hold the patient's head forward—adenoid bleeding comes from the nose, tonsil bleeding from the mouth.

If there is tonsillar hæmorrhage, assume the forehead mirror, fix up the light, insert a Doyen's gag into the mouth, and inspect the throat. If one tonsillar fossa contains a clot, that is the culprit. Otherwise the bleeding will be visible.

At this stage the hæmorrhage is most readily checked by Watson-Williams's clamp firmly and accurately applied, and left on for three or four hours, the discomfort of its presence being lessened by gr. $\frac{1}{4}$ to $\frac{1}{2}$ morph. hydrochlor. hypodermically.

True secondary hæmorrhage may appear in septic wounds a week or ten days after operation. If severe, it may be controlled by the clamps.

For uncontrollable hæmorrhage from the tonsil wound area the faucial

pillars are sometimes firmly sutured over a packing of gauze laid in the bed of the tonsil. Another plan is to cauterize the wound with the diathermy terminal (see p. 72) or with the galvano-cautery. Failing such local measures, the external carotid artery should be ligatured. (See p. 653.)

After-treatment is the same as that for removal of the tonsils by the guillotine.

Septic infection after tonsillectomy is best prevented by attention to the cleansing of the mouth prior to operation as detailed above, and, naturally, to the strict observance of the ritual of aseptic surgery.

In a small proportion of cases, particularly after dissection in adults, the throat wounds manifest a sloughy surface, with redness and œdema of the soft palate and uvula, while moderate pyrexia indicates some general septicæmia. But under simple local antiseptic treatment the symptoms subside in a few days. Those are the cases in which the secondary hæmorrhage we have already mentioned occasionally occurs.

Dangerous sepsis following the operation is excessively rare. In over 5000 tonsil and adenoid operations performed by the writer, in three cases only did death occur in consequence of post-operative sepsis.

Recently, in America, attention has been drawn to the occurrence of the highly dangerous complication of pulmonary abscess and gangrene after tonsillectomy. All the cases recorded have been adults, in most of whom general anæsthesia had been employed. The pulmonary infection is attributed, not to aspiration during the operation, but to infective emboli from a septic throat wound, and stress is laid upon faulty technique, with slow operating and unnecessary crushing of the tissues, as the chief pre-disposing cause.

Results are, as a rule, excellent. Enucleated tonsils do not grow again. But it is impossible to eradicate lymphatic gland-tissue, and later on small lymphoid groups may make their appearance in the faucial pillars, and may even show the phenomena of tonsillitis! But as a rule there is no further trouble.

Not infrequently considerable cicatricial deformity follows the healing of the wound. It can be minimized if, at the operation, the tonsil is thoroughly separated well down to its lower pole before applying the snare, so that the pillars of the fauces are not included in the wire-loop (E. D. Davis).

Even in cases which show little deformity the soft palate after tonsillectomy often becomes so thinned and tightened that it may be difficult to insert the finger into the naso-pharynx.

The removal of tonsils is sometimes followed by weakening of the voice for a few weeks or months after operation. This may be a disconcerting circumstance if the patient is a professional voice-user, but it is not permanent. The same remark applies to "speaking through the nose," a symptom by no means infrequent after tonsillectomy both in children and in adults. It disappears in about three months.

Results of Tonsillectomy in Systemic Disease.—Summing up the percentages of four different observers, we find that 77 per cent. of “cures” or “great improvement” are obtained in the various forms of *rheumatism*, acute, chronic, muscular and rheumatoid. Of these, W. S. Lawrence, dealing with acute rheumatism in children, reports non-recurrence of that disease in 84 per cent. of the cases operated on, and W. M. Mollison gives approximately the same percentage of cures or improvement for rheumatoid arthritis.

With regard to the latter disease, Mollison warns us that even the smallest nodule of tonsil tissue left may continue the rheumatic pains, and the present writer would add that even small clumps of adenoids, if present, should also be carefully removed. The best results are obtained in early cases, and in fibrositis and neuritis. In older patients where bony changes are visible on X-ray examination the results are less brilliant, though even in those the pains may disappear. Vaccines made of cultures taken from the removed tonsils are often useful.

In *chorea*, according to the figures given by two observers, only 38 per cent. of the cases showed no recurrence.

In seven cases of *simple goitre*, according to N. Whitton (‘Edinburgh Royal Infirmary Reports’), three showed cure or improvement; and of eight cases of exophthalmic goitre, four showed cure or improvement.

The Edinburgh reports also deal with six cases of *epilepsy*, of whom four were free from fits several years after the operation.

In “renal” cases, Layman gives the astonishingly high percentage of 81 per cent. of cures.

Where it is important to reduce the bulk of the tonsil and operation is refused, galvano-cautery, or better, diathermy puncture may be used; it is sometimes highly successful. Recently, Irwin Moore has revived the use of the old “London paste”—a composition of caustic soda with slaked lime, and reports much benefit from its application. But the present writer’s experience of this remedy has been disappointing.

Tonsillolith.—Calcareous concretions are occasionally found in the tonsils, either as small discrete bodies embedded in the crypts or as large single calculi, which may reach a great size (C. H. Hayton). They are seldom discovered until after removal of the tonsil, but sometimes they give rise to pain and abscess. Cartilaginous and bony nodules are occasionally found in the tonsil.

Fish-bones or other sharp **foreign bodies** occasionally become fixed in the faucial tonsil. But they are more frequently found in the lingual tonsil.

If a foreign body in the throat is suspected by the patient, examine the throat carefully, and, if it is discovered, remove it with suitable forceps. But it will often happen that no foreign body will be found, the sensation being due to the slight traumatism produced by the foreign body while being swallowed. (See also pp. 182 and 225.)

NEOPLASMS OF THE PHARYNX

Papilloma is not infrequent on the edges or surface of the faucial pillars, soft palate and uvula. The growth is easily recognized by its rough, warty surface, and may be destroyed by an application of lunar caustic or by removal with scissors under local anæsthesia. It should always be submitted to microscopic examination in order to exclude epithelioma.

Angiomata are met with involving the soft palate and uvula. They may be treated by means of electrolysis or by diathermy puncture. Radium is recommended by J. S. Fraser, the tubes being embedded in the growth.

CANCER OF THE PHARYNX AND TONSIL

Epithelioma.—*Ætiology.*—Epithelioma of the pharynx is favoured by old syphilitic scars; leukoplakia of the palate; the habitual ingestion of very hot liquids; the presence of dental caries and pyorrhœa; chronic pharyngitis (perhaps); and excessive smoking.

Symptoms.—In its early stages the growth may quite escape the patient's notice, and medical aid may not be sought until after ulceration, when pain sets in. Or the first sign that anything is wrong is the discovery by the patient of a hard lump in the neck behind the angle of the jaw, from secondary enlargement of the lymph-nodes; so that, while it is a sound surgical rule to search for and to *find* the focus of infection in all cases of enlargement of the lymphatic glands, this rule is most imperative in the region under discussion, particularly in patients at or after middle life. The lymph-nodes are early implicated in cancer of the pharynx, and may attain to a considerable size while the primary growth is still so small as to elude discovery (Bland-Sutton).

The later symptoms associated with cancer of the throat are: shooting pains, increasing difficulty in opening the mouth and in swallowing, salivation, fœtor of breath, and gradual decline in the patient's powers until death occurs, in something under a year from the first discovery of the disease.

Epithelioma may start anywhere in the pharynx, but its favoured sites are the pillars of the fauces, particularly where the anterior pillar joins the tongue, the base of the tongue itself, the soft palate and the tonsils. It is almost always definitely or preponderantly unilateral. In women a common situation is in the laryngo-pharynx. ("Post-cricoid Cancer," see p. 78.)

The growth before ulceration sometimes appears as a pinkish infiltration of the mucosa, to which it imparts a glazed and polished surface broken up by transverse "hacks" or shallow fissures into rectilineal plaques or islets. The infiltration may spread over considerable areas of the mucous membrane before ulcerating, and at this stage it is difficult, without microscopic examination, to make a correct diagnosis of the disease. At other times, the growth in its early stages assumes a granular or warty appearance.

Sooner or later ulceration occurs, and presents the usual typical cancerous appearance, with elevated, indurated edges and rough, irregular granulations.

The hard infiltration of the edges is a diagnostic feature of much importance: thus **all suspicious pharyngeal ulcers should be palpated with the finger** (protected by a rubber finger-stall).

In the later stages, the epitheliomatous growth and ulceration spread widely over the pharynx, until, it may be, tonsil, faucial pillars, uvula and soft palate are occupied by a ragged, foul ulcer, with a hard base and raised, indurated edges.

The lymphatic glands at or a little below the angle of the jaw also enlarge rapidly, and may break down and ulcerate. Death results from inanition, exhaustion, septic pneumonia, general septicæmia, or from hæmorrhage, which is a prominent feature of the final stages.

Diagnosis.—In the early stages it may be difficult to decide whether we have to deal with a cancerous or a syphilitic deposit. In these doubtful cases, where the appearances presented are so indefinite that a decision cannot be arrived at from clinical evidence alone, a piece of the diseased tissue must be removed and examined microscopically. The clinical facts which weigh most strongly in favour of cancer are—(1) the induration of the base and edges of the ulcer; (2) the early enlargement of the lymph-nodes at the angle of the jaw.

We must never forget, however, that there may be a gummatous basis to the cancer. In other words, the lesion may be a mixed one. These are the cases which manifest much improvement when first treated with potassium iodide, but which betray their true character when, as time goes on, the preliminary improvement is not maintained.

Sarcoma.—The faucial and lingual tonsils share with the testicles the reputation of being a favourite site for lymphosarcoma—reputed to be the one form of sarcoma which tends to infect the neighbouring lymphatic glands. The other varieties of sarcomata also occur in the pharynx.

Sometimes sarcoma of the tonsils occurs as a smooth, ovoid, rapidly growing tumour, with a pallid, almost waxen appearance. At other times, and by no means infrequently, the unbroken mucosa covering the tumour is red, congested and oedematous, and then its resemblance to simple peritonsillitis is very close. (See p. 32.)

Its growth, extension and fatal issue may be tragically rapid, and in such cases ulceration is unusual. On the other hand, many cases proceed much more slowly, so that sarcoma in this region is generally considered to be less dangerous than epithelioma. In the slower cases, ulceration and fungation are common.

The prognosis of sarcoma depends upon the type of the growth, and the effects of treatment. The lympho-sarcomata are the most malignant.

Parotid Tumours are occasionally found in the soft palate or peritonsillar region, sometimes isolated, sometimes extending outward into the parotid gland. They manifest the usual variety of structure characteristic of the

parotid tumour. Their course is capricious and incalculable. Some are smooth, encapsulated and of very slow growth; others infiltrate the neighbouring tissues, break down and ulcerate, and, becoming disseminated, lead to death; others again, after years of quiescence, suddenly become malignant. As the microscopic characters are similar in all, it is only by their clinical behaviour that we can judge their character.

Treatment of Cancer of the Throat (Epithelioma).—(1) In early stages, before ulceration has set in, or after ulceration, while the disease is still limited in extent and in depth, and when cervical gland enlargement is either absent or slight, radical excision of the growth, either with the knife, or, what is better, with the diathermy knife-terminal, accompanied or preceded by the clearing of the fascia and glands of the same side of the neck, affords the patient his best chance.

(2) In more advanced stages, when the pharyngeal growth is inoperable and the cervical glands are large and fixed, even then it may be possible to prolong the patient's life in usefulness and even comfort for six months or a year by the judicious use of diathermy.

Diathermy is a modification of the high-frequency current. In its passage through the tissues this current develops heat, and if two terminals be brought into contact with the body, one of which covers a large superficial area of skin while the other is small, the heat concentrated around the latter may be made so great, by strengthening the current, as to char the tissues around it, while, at the same time, the zone surrounding the charred area undergoes heat coagulation. Thus, if applied to a cancerous ulcer or growth, in addition to the area visibly cauterized, there is set up in the deeper tissues a destroying action which results in a more extensive destruction of the tissue than is evident at the moment. (It should be noted that the terminal itself does not become heated. It is never red-hot as the electric cautery is.) The coagulation slough formed in this way separates in the week or ten days following the application. But its separation seems to be effected aseptically. There is little or no reaction, either local or general, and practically no pain.

Experience has proved diathermy to be of great value in pharyngeal cancer, particularly of the inoperable type. By direct and repeated applications in this latter variety it is possible to slow down the rate of growth and of extension, and to remove the pain and soreness, so that the patient can swallow, and can go on working and living his normal life for months longer than one might reasonably have expected. One cannot claim for it that it cures the disease.

In applying the diathermy a general anæsthetic is required, and it is advisable not to prolong the exposure for more than twenty minutes, as it has been found that a reactionary pyrexia may follow too prolonged an exposure, and, indeed, may prove fatal.

(The limits of usefulness of diathermy are not yet settled, as it can be used for many other conditions besides pharyngeal cancer. I have employed it to remove tonsils and to eradicate synechiæ of the nose.)

OPERATIONS FOR THE REMOVAL OF ERADICABLE
EPITHELIOMA OF THE PHARYNX

The removal of what looks like an eradicable epithelioma of the pharynx involves, as has been said, a double operation—one on the pharynx, the other on the neck. The author advises that the operation on the neck should precede that on the pharynx, and by several days, because the external carotid artery can then be ligatured, and the subsequent operation on the pharynx performed with more deliberation and precision, as we are but little incommoded by bleeding. The interval of a few days is necessary to allow of the patient recovering from the neck operation, as that is sometimes prolonged and severe.

Preparation.—Previous to the operation, or operations, all teeth, whether sound or decayed, must be removed, and the wounds in the gums allowed to heal. An antiseptic mouth-wash is given to aid the cleansing of the mouth.

Operation on the Neck (see also Norman Patterson's article, 'Journ. of Laryng. and Otology,' vol. xl, p. 305).

The patient lies on his back with the face turned to the opposite side. A small pillow under the shoulders suffices to put the neck somewhat on the stretch. The surgeon stands at the side to be operated on; his assistant at the other side; the anæsthetist at the head of the table.

The skin-incisions vary with the extent of clearance of fascia, etc., deemed necessary. (1) When the whole side of the neck is to be exposed and operated on, three incisions are made: (*a*) Transverse, from under the point of the chin, below the ramus of the jaw and the auricle, to the posterior attachment of the sterno-mastoid to the skull; (*b*) vertical, from the angle of the jaw to just above the clavicle; (*c*) transverse and short, at the lower end of the last, to give access to the inferior attachment of the sterno-mastoid. (2) When the carotid triangles and the posterior triangles only are to be cleared, an incision is made along the anterior border of the sterno-mastoid from the angle of the jaw to near the clavicle, and a second from the middle of the latter incision and at right angles to it, backwards over the sterno-mastoid into the posterior triangle.

Some operators strip the whole side of the neck of its fascial layers, including even those of the pre-thyroid muscles and of the submaxillary region with its contents; others, following the usual route of the lymphatic spread, content themselves with a clearance limited to the carotid and posterior triangles.

In any case, the sterno-mastoid muscle should be divided below, near its origin, and above near its insertion, dissected free of its deep attachments and removed. Only by so doing can the glands and fascia in and about the carotid chain be seen and satisfactorily removed.

The treatment of the jugular vein is dictated by the condition of the glands. If they are small and discrete they can be safely separated from

the intact vein and removed. But if they are adherent to the vein the simplest plan is to divide the vessel between ligatures above and below the glandular masses and to remove the whole in one piece. Care must be taken not to open the glands or living cancer-cells may be sown about the wound. The danger may be avoided by puncturing the enlarged glands freely with the active diathermy needle before proceeding to remove them—a process which destroys the living cells.

Advantage is taken of the exposure of the great vessels to ligature the external carotid artery in order to lessen the hæmorrhage during the pharyngeal operation and the subsequent separation of the diathermy sloughs.

The posterior triangle, as well as the carotid triangle and the muscles that underlie the sterno-mastoid, are all cleared of fascia, glands and fat. In doing so, care must be taken of the cervical, brachial and phrenic nerves, and, on the left side, of the thoracic duct.

Before closing the wound diathermy may be applied to cut edges of fascia, to the beds of glands, and wherever cancer-cells are likely to lodge. With the object of sterilizing of cancer the undivided tissues that lie beneath the angle of the jaw, through which the lymphatic drift of cancer-cells from the growth in the pharynx must pass, the writer punctures this region several times with the diathermy needle, entering towards, but not as far as, the pharynx. (Fig. 25.)

The wound in the neck is then closed by sutures, ample provision being made for drainage.

Operation on the Pharynx.—The position of the patient is the same as that for the removal of tonsils by dissection. In many the Davis gag and the reversed head will be found advantageous, but not if part of the tongue is to be removed.

Chloroform is necessarily the anæsthetic used, as a spark from the diathermy terminal might cause an explosion if ether were employed.

The excision of the growth is best accomplished with the diathermy knife. After the surface of the ulcer has been sealed by diathermy, the growth is encircled with the diathermy knife, carried down through healthy mucosa and submucosa to the muscular layer or deeper, half an inch or thereabouts outside the edge of infiltration. This incision is now deepened at its most accessible part, and the edge of the tissue to be removed is grasped with Hett's tonsil-forceps, and, by careful dissection, using always the active diathermy terminal, the diseased area is undercut and removed, if possible in one piece. The separation is effected in such a way as to avoid leaving behind any portions of the growth. Extensive areas of the pharynx may thus be removed, generally without much loss of blood. When the growth extends towards or into the tongue a generous portion of that organ should also be excised.

The diathermy terminal may be brought into contact with bone if necessary, as the destroyed bone subsequently sequesters or crumbles away, usually, though not invariably, without becoming septic.

Finally, after all obvious growth has been removed, the raw surface

left is coagulated with a pointed button-terminal pressed deeply into the tissues.

After-Progress.—A rise of temperature to 102° or 103° F. for a few days after the throat operation need occasion no apprehension. Shock is slight or absent. Swallowing is difficult and sometimes painful for a few days, but the patient quickly adapts himself to his new conditions. The dia-

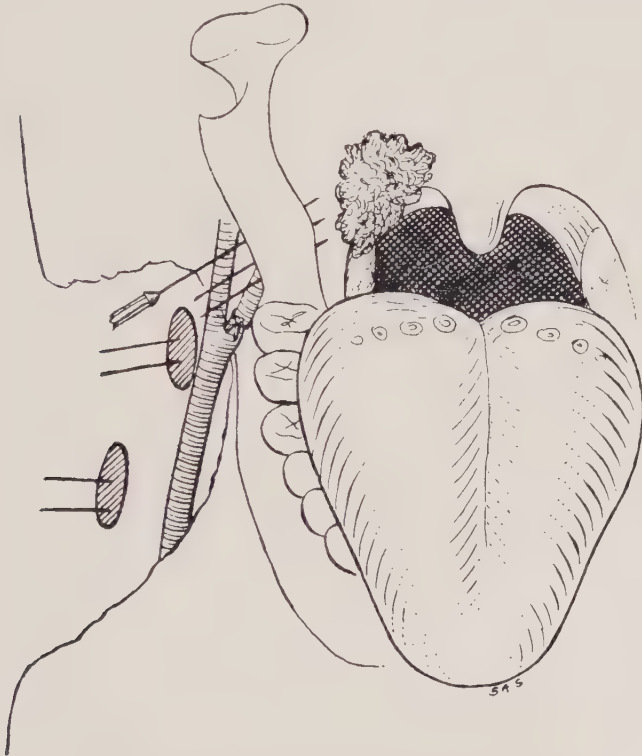


FIG. 25.—Diagram to Illustrate Diathermy Puncture of Glands prior to their Removal and Diathermy Puncture of Tissues between Neck Wound and Primary Growth in Pharynx.

thermy slough separates in about a fortnight, with little fœtor and no evidence of wound infection. The best method of keeping the mouth clean and comfortable is to syringe it out with normal saline solution by means of a Higginson syringe.

The granulations, which become visible after the sloughs separate, should be small and smooth. If unduly prominent, they are to be regarded with suspicion, as they may be remnants of growth. Epithelialization in successful cases is surprisingly rapid; it is usually complete in from six to eight weeks.

Afterwards there ensues a pronounced cicatricial contraction of all the parts involved in the diathermy operation (Fig. 26), the fauces being narrowed, save when the soft palate has been removed, and the tongue caught up and pinned to the side of the pharynx.

Results.—When complete eradication of the disease has been effected, freedom from recurrence may be obtained for several years. Patients

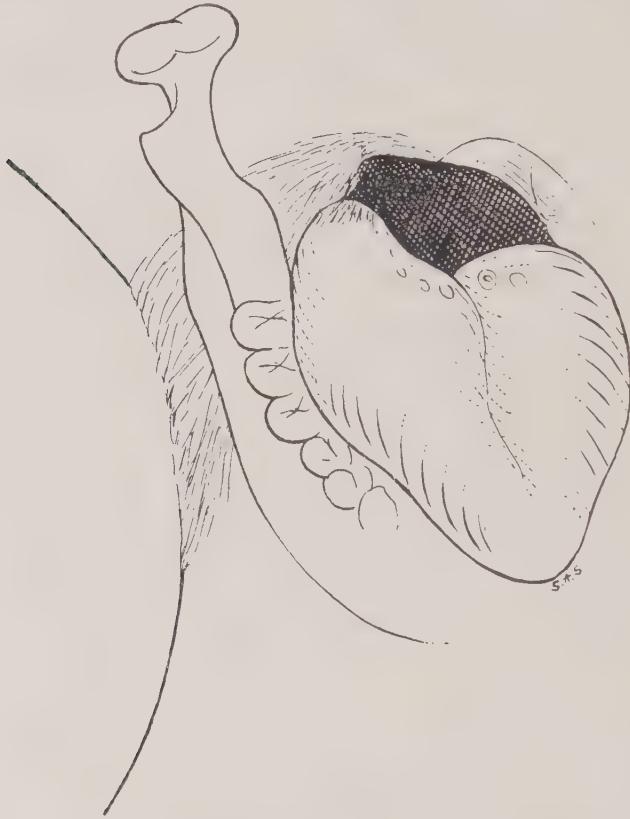


FIG. 26.—Area of Epitheliomatous Infiltration replaced by Cicatricial Tissue after Diathermy. (Diagrammatic).

thus operated on should present themselves for examination once a month.

If diathermy is not available, excision of the pharyngeal growth may be performed with the ordinary surgical knife. Many surgeons, indeed, still prefer it. And, in addition to the above operation, other procedures are in vogue. Wilfred Trotter, *e. g.*, approaches the tonsil region through

the ramus of the jaw, by what he calls *upper lateral pharyngotomy*. (See 'Journ. of Laryng. and Otology,' vol. xxxv, p. 289.)

All the above methods of operating are, of course, still on trial.

Treatment of Ineradicable Epithelioma of the Pharynx.—When the primary growth is adherent to bone, when cancerous glands are large and adherent to each other and to the surrounding structures, extirpation of the disease is beyond our reach. But in diathermy we possess an agent which frequently enables us to ameliorate the patient's sufferings and to prolong his life.

Neck Operation in Ineradicable Epithelioma.—If the glands can be removed they ought to be removed, the complete operation on the neck as described above being performed. If it is impossible to remove them, they may be submitted to a number of diathermy punctures made through a small incision to one side of the most prominent point of each gland, as this has the effect of shrivelling them up and retarding their subsequent growth, sometimes for several months (W. Stuart-Low). If, however, the glands are large, prominent and extensively softened, it is best to leave them alone.

If at all possible, the external carotid artery should be ligatured.

Operation on the Pharynx.—Without making any attempt at removing the primary growth, a blunt diathermy terminal is applied methodically to the entire surface, base and edges of the growth *in situ*, so as to destroy it as completely as possible. The superficial layers may be carbonized and curetted away with a sharp spoon, but on reaching the deeper portions of the growth the current is reduced and slow coagulation of the tissues effected, in order to obtain the greatest depth of penetration possible. A needle terminal may be used to puncture the tissues underlying the growth.

Results.—This palliative operation is often remarkably successful. The foul ulcers clean; pain disappears, sometimes at once; and some epithelialization of the surface may even occur. This welcome pause in progress lasts from six weeks to three months. Then the symptoms return with a suddenness which shows them to be due to a renewed septic infection of the cancerous area. For, apart from its destructive power, diathermy by its heating sterilizes the diseased tissue of bacteria—a property of much value in cancerous ulcers of the pharynx, which are always septic.

On the return of the symptoms, diathermy may be applied again. And yet again. At last, however, there comes a time when the growth is seen to be obviously beyond control, and then we must abandon our efforts.

Sarcomata of the Pharynx may also, in some favourable instances, be treated by excision with the knife or the diathermy point. When excision is out of the question radium therapy is the most popular method of treating this variety of malignant disease. A tube containing 50 to 100 mgrm. of the radium salt suitably screened, or else two or more fresh radium-emanation tubes ("radon"), are buried in the body of the sarcomatous

tumour, and left there for a period of from eight to twenty-four hours, according to the size of the tumour. The result is sometimes dramatic in the rapid, complete disappearance of the tumour. Cases of non-recurrence have been recorded; but as a rule a fatal issue takes place within two or three months, not so much, perhaps, as a result of the pharyngeal growth as from the action of metastases. Probably, therefore, successful cases are those in which radium is applied before any dissemination has occurred.

Parotid Tumours of the Pharynx, if isolated and encapsuled, are readily shelled out of their seat in the soft palate, and if completely enucleated may never return. When they are behaving as malignant ulcerating growths they must be treated on the principles outlined above. In fixed, irremovable tumours of this class I have found radium, followed in a few weeks by extensive diathermization, of great value.

The influence of radium upon epitheliomata of the pharynx, on the other hand, seems to be less favourable than that of diathermy. Sometimes the radium seems actually to encourage the cancerous growth.

POST-CRICOID CANCER

(CANCER OF THE LARYNGO-PHARYNX)

Ætiology.—The laryngo-pharynx tapers downwards as it passes into the œsophagus at the lower border of the cricoid cartilage, and here the food-passage is narrower than it is either above or below. Secondly, it is here lodged between the cricoid cartilage in front and the vertebral column behind, and, as may be discovered by moving the larynx from side to side with the hand placed on the front of the thyroid cartilage, those two hard structures are, save in the act of swallowing, in close apposition. Thirdly, cases have been recorded of (?) congenital narrowness of the lumen at this place, giving rise to dysphagia, and in some cases of post-cricoid cancer difficulty in swallowing has been present for many years.

Further, D. R. Paterson has drawn attention to the frequency with which women suffering from this disease present a thin, glazed mucous membrane in the mouth and pharynx, while Dundas-Grant, impressed by its occurrence in people who have lost many teeth, thinks that it may be set up by the swallowing of imperfectly masticated food. Others, again, have referred it to the habitual drinking of hot liquids.

The conclusion that emerges from a synthesis of these various observations and opinions obviously is that this is a form of traumatic cancer.

Post-cricoid cancer is commoner in women than in men—86 per cent. compared with 13 per cent., according to A. Logan Turner. In women, also, it occurs at an earlier age. Cancer of the œsophagus elsewhere, on the other hand, is commoner in men than in women—71 per cent. compared with 28 per cent. according to the same authority.

Pathology.—This is, as a rule, a squamous epithelioma. The usual

site of origin is not yet known, but in an early case seen by the writer, the growth was limited to a spot on the anterior wall about half an inch above the orifice of the œsophagus. (See also Fig. 27.) Beginning in the mucosa it spreads both transversely, becoming in time annular, and longitudinally, in which direction it may spread for two or more inches. (Fig. 28.) It penetrates the muscular coat, to reach the adjoining deep region of the neck, where it may form a mass continuous with the original growth, that feels, on palpation from without, like an enlarged lymphatic gland. Sometimes it enters and spreads in the thyroid body, simulating a malignant goitre. It quite commonly destroys the conductivity of the recurrent laryngeal nerve.

Symptoms. — Post-cricoid cancer is generally latent until it has become annular, or until it is so extensive as to interfere with the passage of food, and then the patient comes for relief of that symptom. The dysphagia is gradual in onset, but progressive. Hyper-secretion of saliva, which remains about the upper aperture of the hypopharynx and larynx, is visible on laryngoscopy. The disease, when fully developed, gives to the voice a characteristic muffled tone (W. M. Mollison), and there is often hoarseness from recurrent paralysis or infiltration of the crico-arytenoid articulation. Pain is sometimes early, but more often late, and is most marked on swallowing. The progress of the patient downhill is rapid as in œsophageal cancer, and the end comes from inanition and general weakness, and may be precipitated by septic pneumonia if the disease extends upwards to involve the orifice of the larynx. The average duration of life in an untreated case is only four months. But in one case seen by the writer, progress was very tardy and the patient survived several years.

Diagnosis. — In most cases the laryngeal mirror shows the upper end of the growth beginning to involve the pharyngeal or posterior aspect of the laryngo-pharyngeal wall, as an irregular and nodular infiltration with

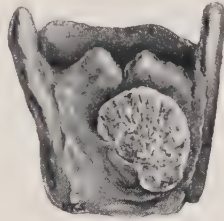


FIG. 27.—Early Post-cricoid Cancer. Specimen removed by operation by E. B. Waggett. (From E. D. D. Davis.)



FIG. 28.—Advanced Post-cricoid Cancer. (From E. D. D. Davis.)

some oedema above and around it. Occasionally the oedema is all that is visible. One or other vocal cord may be immobilized from interference with the recurrent laryngeal nerve.

In these cases hypopharyngoscopy will sometimes reveal the disease. (See p. 105.)

But often there is no sign of any disease visible on indirect laryngoscopy, and only examination by X-rays and by the direct method can be relied upon to exclude the disease or to disclose it. Screen examination with the X-rays shows the normal full barium shadow reduced to a thin and often serpentine trickle, and a radiogram will reveal the length of the stricture. On using the direct method, the cancerous growth appears as an area of infiltration and ulceration, readily bleeding, and interfering with the free downward passage of the tube about the level of the cricoid (lower pharyngeal isthmus). For this reason a tube of moderately small calibre only should be used when cancer is suspected, and no attempt should ever be made to push it on into the œsophagus beyond the growth, as the cancerous wall is extremely friable, and its rupture would be followed by cervical cellulitis and perhaps rapidly fatal mediastinitis (see p. 101). A piece of the growth may be removed for microscopic examination.

Treatment.—(a) *Radium* has many advocates, and it is, indeed, sometimes very useful, especially in inoperable cases. A radium (or radium-emanation) tube of 50 to 100 mgrm., suitably screened and secured by a long flexible leaden style (William Hill), is inserted by means of suitable forceps through the direct tube, and allowed to remain *in situ* for from eight to twelve hours, according to the size of the growth. The patient meantime lies quietly in bed, and is kept under the influence of morphia; no food or liquid is allowed, thirst being controlled by rectal salines.

The exposure is followed by a well-marked reaction, as is evident in the increased swelling and oedema of the parts in the neighbourhood of the growth. This slowly subsides in the course of about six weeks, and with its disappearance the growth undergoes a rapid atrophy until, in favourable cases, no trace of the original disease can be found. Even scarring may not be perceptible.

After from three to six months of freedom from dysphagia and pain, recurrence usually sets in, either locally, in which case the throat symptoms reappear, or in the glands, in which case the disease may go on to its termination without giving rise to much pain or distress.

In a few cases the application of the radium seems to do harm. The growth is stimulated, the pain becomes more severe, and the patient rapidly loses ground.

(b) *Diathermy* can be applied through the direct tube to post-cricoid carcinoma by means of a blunt terminal on a long handle. The coagulation-destruction of the growth relieves the dysphagia, but it is difficult to regulate the depth of coagulation, and the wall may subsequently give way, leading to deep cervical abscess. Diathermy is therefore unsuitable for cancer in this situation.

(c) *Operative Treatment* may be tried when the growth does not entirely surround the pharyngeal opening—if, that is to say, there is a strip of sound mucous membrane that may be left to carry on the œsophageal connection.

Two methods have been tried: First, excision of the larynx, and then removal of the cancer-bearing mucosa behind it, the sound strip referred to

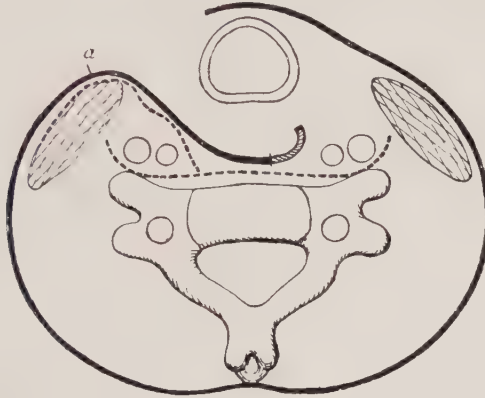


FIG. 29.—Operation for Removal of Post-crioid Carcinoma. Restoration of Lumen of Hypo-pharynx. (From W. M. Mollison.)

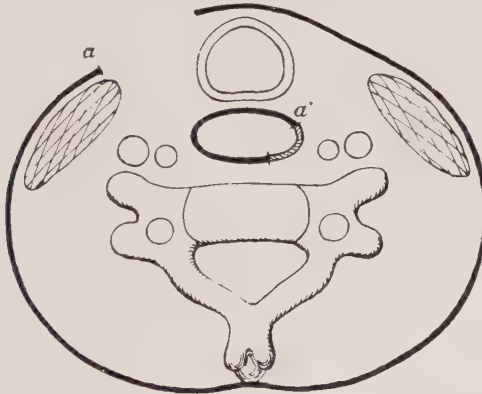


FIG. 30.—Restoration of Lumen completed.

above being left. A feeding-tube is inserted from the nose, and left in the gullet for at least three weeks. The wounds made are stitched up entirely. (E. Waggett.) (See p. 156, Laryngectomy.)

Or secondly, the operation devised by Wilfred Trotter and termed by him *lower lateral pharyngotomy* may be adopted. (See p. 165.)

The lumen of the new tube may be made up by a flap of skin turned in from the neck. (Wilfred Trotter.) (See Figs. 29 and 30.)

For *Malignant Disease of the Naso-Pharynx*, see p. 401.

SYPHILIS OF THE PHARYNX

Hereditary Syphilis in infancy sometimes manifests itself in the tongue and pharynx in flattish condylomata and inuuous patches, or in shallow ulcers on the fauces and tonsils, but these appearances are not common.

About puberty gummatous perforations of the palate and deep ulcerations of the pharynx are sometimes seen.

Acquired Syphilis : The Primary Sore.—When an individual is infected with syphilis through the mouth, the most usual site for the primary sore to form is on one of the tonsils, and as the local reaction may be slight, and the patient be unaware of its presence, this is one of the varieties of primary sore which often give no hint of their existence, and leave no trace behind them.

The primary sore may also be seen on the lips, tongue and faucial pillar.

Cause.—The conveyance of the infection to the mouth or pharynx may be due to kissing a person with primary or secondary syphilis of the pharynx or mouth ; to infection from drinking vessels ; as well as to unnatural practices.

Symptoms.—The patient experiences a sore throat, the pain and discomfort of which are one-sided. It lasts for from four to six weeks, and is accompanied with considerable enlargement of the glands at the angle of the jaw on the same side.

Septic infection of the locality may transform the appearance of the case into one resembling acute septic pharyngitis with high temperature and constitutional disturbance.

Diagnosis.—Unless the possibility of syphilis occurs to the physician, the true nature of the case is very apt to be overlooked. Chancre of the tonsil manifests no very striking or characteristic phenomena. The tonsil is inflamed, its size is greater than normal, and it may present an erosion or an ulcer with or without raised edges. The appearance may thus simulate Vincent's angina or epithelioma. If suspicion is aroused by the chronicity and by the enlargement of the glands, the diagnosis can be thereupon established by the discovery of the *Spirochaeta pallida* on needling the tissues deep to the ulcer ; by the Wassermann reaction becoming positive ; or by the development of secondary symptoms.

The disease should not be diagnosed as syphilis solely from the clinical appearances in the throat.

Treatment.—The constitutional treatment of syphilis by one of the salvarsan group and by mercury should at once be instituted.

Locally, Sir StClair Thomson advises the careful application of pure carbolic acid to the dried surface of the ulcer, and septic infection should be prevented by the use of an antiseptic mouth-wash and gargle.

Secondary Syphilis of the Pharynx.—Syphilis in the secondary stage

affects the pharynx as part of the general constitutional reaction and appears about the same time as the secondary skin rash—that is, from five to twelve weeks after infection, and sometimes later. This is the most infectious stage of the disease, and the lips, tongue, mouth and their secretions are all virulent.

Symptoms.—There is sore throat affecting both sides of the pharynx, and lasting from three to six weeks, with moderate glandular enlargement. At the same time, the constitutional phenomena of syphilis are manifesting themselves in the syphilitic roseola; the evening temperatures; the headaches; the gland enlargement and induration; and the loss of hair. But all of these symptoms are often so mild as to attract no attention.

Signs.—The throat shows general congestion, symmetrical and sharply defined at the upper limit of the soft palate. Mucous patches—slightly elevated bluish-white areas, with a filmy adherent surface, the so-called “snail-tracks”—are common, being symmetrically disposed on the anterior aspect of the faucial pillars where the dorsum and edges of the tongue come into contact with those parts when the mouth is closed. They are also found on the sides of the tongue, and on the surface of the tonsils. At a later stage symmetrical shallow ulceration is occasionally seen, which, if neglected, may manifest an excavating tendency until its appearance comes to resemble that of the deeper tertiary ulcer.

Diagnosis.—A sore throat in an adult which lasts any longer than three weeks should always raise the question of syphilis.

The “secondary throat” is distinguished from a simple pharyngitis by its chronicity when untreated, and by the mucous patches, which are unmistakable when once seen. The inspection should be made by daylight or other white light.

Prognosis.—Secondary syphilitic pharyngitis passes off spontaneously in most cases in four to six weeks, but if untreated, as already noted, deep ulceration may supervene. Under treatment, the disappearance of the throat phenomena is rapid.

Treatment.—General.—The modern constitutional treatment of syphilis consists in the administration of one of the salvarsan group of drugs generally intravenously, together with the regular administration of mercury by the mouth, by inunction, or by intramuscular injection, assisted by iodides when there is much infiltration or ulceration.

Neo-salvarsan, novarsenobillon or neo-kharsivan (0.75 of a gramme) is dissolved at the moment of use in a fixed quantity of distilled water. One of the veins on the front of the elbow is usually selected for the intravenous injection of the solution. Its exposure by dissection is unnecessary, as with a suitable needle the lumen may be safely reached through the skin. It is well to inject a little saline first to make sure that the needle is accurately within the vein, otherwise the arsenical solution may find its way into the tissues, and set up sloughing.

The injection may be repeated every week or so for three or more weeks, while mercury is also being administered.

The salvarsan drugs are specially valuable in laryngeal syphilis where iodides are inadmissible, and a prompt effect is required to relieve stridor and dyspnoea. (See p. 126.)

Contra-indications.—They should not be employed when there is any nerve-deafness or vertigo, as their immediate effect upon syphilitic lesions is to set up a congestion in the neighbourhood (the Jarisch-Herxheimer reaction), and this may permanently destroy the functions of the acoustic and vestibular nerves. They are also contra-indicated if there is albuminuria.

Mercurial Treatment—

(1) By the mouth :

R	P. Hydrarg. c̄. Cret.	.	.	.	.	gr. j
	P. Ipecac. Co.	.	.	.	.	gr. j
						<i>Misce</i>

in pill, is given three times a day for three months at a time with a month's interval between the courses. The pills are continued for upwards of two years.

(2) By inunction :

R	Ungt. Hydrarg.	.	.	.	.	gr. xl
	Adip. Lan.	.	.	.	.	gr. xx
						<i>Misce</i>

is rubbed for half-an-hour daily into the inner side of the thighs, the flexor aspect of the arm, and the abdomen, alternately.

This is carried on with a day's rest once a week for (1) six weeks, followed by a three months' interval ; and (2) a second course of six weeks, followed by another three months' interval ; and (3) a third course of one month, followed by an interval of six months ; and (4) a fourth course of one month, followed by an interval of six months ; and (5) a final course of three weeks.

(3) Intramuscular injections : Lambkin's grey oil containing 1 gr. of mercury in 10 minims is recommended.

The oil is liquefied by warming and stirring, and the syringe, which is furnished with a wide-bore needle, aspirates 10 minims. The needle is plunged vertically into the fleshy buttocks, and after insertion, the barrel is detached from the needle to make certain that no vein has been punctured. If blood comes from the needle it should be withdrawn and inserted at another place.

Of the above methods the oral is the least troublesome, but it is also the least effective. The intramuscular method is the most certain and convenient, but it is not quite free from risk. Inunction is an unpopular method in ordinary life.

Iodides are used in the tertiary stages when there are gummata and ulcers. Iodide of potassium alone is selected, save when large doses are given, in which case the iodides of sodium and ammonium may be combined

with it. The drug is given by the mouth half-an-hour before food, beginning with from 6 to 10 gr. and increasing until its effect becomes visible. As much as 180 gr. and even more, may be given every twenty-four hours.

In severe cases of syphilitic destruction of the nose, throat, or larynx, the patient should be kept in bed and well supplied with nourishing food, as the disease in these conditions is not only frequently obstinate, but it is also occasionally dangerous to life. (See also p. 229.)

Locally.—A gargle and mouth-wash of—

R	Potass. Chlor.	.	.	.	.	.	gr. x
	Lot. Nig.	.	.	.	.	.	℥ j
	Aq.	.	.	.	.	.	℥ j
							<i>Misce</i>

is used after each meal.

For the mucous patch, the application of chromic acid (gr. x to ℥ j) or silver nitrate (gr. xx to ℥ j) is useful.

Tertiary Syphilis of the Pharynx.—Three varieties of lesion are met with—the gumma, ulceration, and diffuse infiltration.

With the exception of the ulcer which sometimes supervenes upon the secondary syphilitic pharyngitis, the tertiary lesions appear late in the history of the disease, namely, from the eighth to the fourteenth year after infection.

The *gumma* generally attacks the soft and hard palate near the middle line, but it is seen also on the tonsil, on the posterior pharyngeal or naso-pharyngeal wall, and on the base of the tongue. It seldom comes to our notice until it has begun to ulcerate, and then there is a bright red and swollen area of infiltration surrounding a deep *ulcer* with punched-out edges, and a yellow, tough, wash-leather base. In the soft palate the deepening ulceration, which often commences on the naso-pharyngeal aspect of the palate, has generally advanced to perforation before the surgeon sees the case. When the hard palate is affected, the bone becomes involved in the disease, and perforation leads to a communication being formed between mouth and nose. Neglected, such infiltration and ulceration may rapidly extend until there is widespread destruction of tissue in the pharynx and palate. *Diffuse infiltration* may occur alone or in association with gummata or ulceration. It presents no distinctive features beyond thickening of the tissues, and may form in almost any part of the pharynx, including the tonsils. It is not common.

Symptoms.—The subjective phenomena are often unobtrusive, and the amount of pain experienced trifling. Nasal phonation or the passage of liquids into the nose on swallowing may be the first symptoms to attract the patient's serious attention.

Tertiary ulcers are readily seen on inspecting the throat, but it sometimes happens that when situated on the posterior aspects of the palate or tonsils they escape discovery. Any localized congestion of these regions

should, therefore, always lead to an inspection of their hidden posterior surfaces with the post-rhinoscopic mirror, or with the naso-pharyngoscope.

Diagnosis.—Chronic pharyngeal ulceration is, to mention the commoner types only, either syphilitic, tuberculous, lupoid, or cancerous in nature, and of these the syphilitic is by far the most common. Its early diagnosis is essential if destruction and deformity are to be prevented.

The *syphilitic ulcer* is relatively painless, of sudden origin and rapid course; it presents a purplish edge, deep punched-out sides, wash-leather base, and it is not noticeably hard or indurated. It is associated with the other signs of syphilis—the Wassermann reaction is usually positive, and the disease shows rapid improvement under anti-syphilitic treatment.

With regard to the Wassermann reaction, caution is necessary. On the one hand, a positive result, while it generally indicates that the patient has had syphilis, yet it does not certify the lesion we are doubtful about to be itself syphilitic. On the other hand, a negative Wassermann reaction may be obtained from the blood of a patient with active syphilis, even after he has received a provocative course of anti-syphilitic treatment. The result of the reaction must therefore always be regarded as only one item in the group of data, and, if it appears to be at variance with the other facts in the case, either for or against the diagnosis of syphilis, it should be ignored.

The *tuberculous ulcer* (see p. 87) is exceedingly painful, of insidious origin, and slow course; its edges are smooth, and the mucosa around is pallid; the sides of the sore are very shelving, the base is grey and pale, and there is no induration. There are no syphilitic stigmata except in mixed cases, which, however, are not infrequently encountered. The effect of anti-syphilitic remedies, however, is negligible, even in mixed cases.

The *lupus* ulcer is painless; its surface is grey, dry and granular; its floor and the mucosa around it are infiltrated with lupus nodules, and deposits are found also elsewhere, usually in the nose.

The *cancerous ulcer* is painful, with thickened, irregular and hard edges, and with hard, infiltrated base. The secretion is foul, and, if advanced, there is interference with movement. The cervical glands are enlarged and hard. (See also p. 70.)

For diagnosis from Vincent's angina, see p. 36.

The cases most difficult of prompt diagnosis are those in which there is a mixed lesion, syphilis and cancer being the most common. Then, immediate improvement follows anti-syphilitic measures, but it is not sustained. In any doubtful case, a portion of the ulcer, including the margin, should be punched out and examined microscopically.

The *Prognosis of Tertiary Syphilis of the Pharynx* is most favourable when the disease is in its earliest stages, because then the loss of tissue is but trifling, and the amount and degree of cicatrization is limited. More advanced cases are favourable in so far as the cure of the active disease is concerned, but loss of tissue cannot be made good.

Treatment.—General treatment is in most cases all that is required, the

ulcers healing up rapidly. (See p. 83.) Locally, if foul, ulcers may be cleansed by regular spraying with fresh hydrogen peroxide solution (5 to 10 vols. per cent.). The teeth should receive attention.

Cicatrization.—The healing of tertiary ulcers of the pharynx is attended with much scarring, often stellate in form, and if there has been considerable tissue-destruction the pharynx will show great and permanent deformity. The uvula may be absent, with more or less of the soft palate and the faucial pillars, while the contraction of the scar-tissue may induce a troublesome narrowing of the isthmus of the fauces. Later on in life the scar-tissue may become the seat of epithelioma. Cicatrization leading to occlusion of the soft palate has already been dealt with (p. 21).

Persistent perforations of the palate can be blocked with suitable obturators.

TUBERCULOSIS OF THE PHARYNX AND TONSILS

Excluding lupus, there are two varieties of tuberculosis of the pharynx.

The First and Commoner Variety affects the tonsils, and is due to their invasion by the bovine tubercle bacillus. As it is a milk infection, it is commonest in childhood. In this type the disease occurs in the substance of the tonsil; it rarely produces ulceration; it is not, at this stage at all events, accompanied with pulmonary tuberculosis; but it is associated with tuberculosis of the cervical glands, of which, indeed, it is the precursor and introducer. (A. P. Mitchell.)

Symptoms.—There are no symptoms referable to the pharynx. The tonsils are generally shrunken and atrophied, although the cervical glands are enlarged.

Prognosis.—Locally, the disease in the tonsil runs a quiet and uneventful course, and its only importance—but this is great—is that as long as it remains in existence, the disease in the cervical glands is incurable.

Treatment.—In all cases of tuberculosis of the cervical glands, whatever treatment be adopted for them, **the tonsils must be dissected out, whether they appear to be enlarged or not**, in order to seal up the channel by which the tubercle bacillus attains entrance.

At the same time no milk is to be consumed by the patient but what is sterilized by heat.

The Second and Rarer Variety is the surface ulceration of the pharyngeal mucosa found occasionally in phthisis pulmonalis, of which it is the sequel, the infective sputum being responsible for the disease. It is found in adults, and is not associated with tuberculosis of the cervical glands. The tuberculous pharyngeal ulcer is usually a late phenomenon in the course of pulmonary disease, but occasionally it appears early and spreads to involve extensive superficial areas of the pharynx.

Symptoms.—Tuberculous ulceration of the pharynx gives rise to pain on swallowing so severe that the patient prefers to go without food sooner than endure the distress that swallowing produces.

On examination the ulcer appears as a more or less extensive, shallow grey area, with eroded, nibbled edges. Its favourite sites are the base of the tongue, the posterior wall, and the uvula and soft palate.

The *prognosis* of this variety of tuberculous ulceration of the pharynx is bad. By interfering with nutrition, it hastens the downward course of the pulmonary disease.

Treatment can only be palliative. It may be possible to reduce the sensitiveness of the ulcer sufficient to enable the patient to swallow by insufflating upon it the powder of orthoform, or by spraying it with sol. cocaine (5 to 10 per cent.). Morphia hypodermically should be employed if the pain is severe.

Acute Military Tuberculosis of the pharynx is described. It appears as minute discrete tubercular deposits visible on inspection, and occurs in the terminal stages of phthisis pulmonalis. It is very rare.

(For tuberculosis of the retro-pharyngeal region, see p. 47.)

It may here be mentioned that only about 5 per cent. of the ordinary hypertrophied tonsils contain tubercle bacilli (Howarth and Glogner).

LUPUS OF THE PHARYNX

Lupus of the pharynx is almost invariably secondary to lupus of the nose or face. As is the case when the disease attacks the integument, lupus of the throat is insidious in onset and very chronic in its course.

Subjectively, only slight soreness or some cough or dysphagia may be complained of. Pain is usually absent.

Physical Signs.—There is a slow deposit of lupus nodules, first affecting the posterior wall or the uvula and pillars of the fauces, and presenting the appearance of smooth, hard, rose-coloured nodules embedded in the mucous membrane. Their pinkish, apple-jelly-like colour is well brought out by adrenalin. When widely diffused, they distort the shape of the parts, thickening fine folds, blurring clear edges, and imparting also a certain stiffness or wooden appearance to structures normally flaccid and movable. Later on, serpiginous, "worm-eaten" *ulcers* appear, with velvety, indolent bases. As in the skin, Nature's attempts at healing are marked by the presence of cicatrices.

Prognosis.—Lupus of the pharynx is amenable to treatment. The danger is that the disease may extend to the larynx (see p. 137), and eventually lead to pulmonary tuberculosis.

Treatment—General.—Generous feeding with malt, cod-liver oil, cream and tonics, arsenic especially, are indicated. *Locally*, each nodule is punctured with the galvano-cautery or diathermy needle. A number of applications may be required before the whole of the disease areas have been overtaken, and, as the disease is prone to recur, the patient should be kept under observation for a prolonged period, every little nodule being treated as soon as it appears.

When it attacks the hard palate, as it not infrequently does, a thorough

coagulation of the area with diathermy has proved to be a most reliable remedy in my hands. (For treatment by radium, see p. 302.)

Pharyngomycosis, or to speak more accurately, **Keratosis Pharyngis**, is the growth of the *leptothrix* fungus in spots where the epithelium of the pharynx has undergone cornification (keratosis).

Symptoms.—The disease is generally discovered accidentally, as in most cases it induces no subjective phenomena. Sometimes, however, patients complain of irritation or pricking, for which no other cause than the keratosis can be found.

On *inspection* the faucial, and sometimes the lingual, and the nasopharyngeal tonsils are seen to be studded with small, white spots, which, on being grasped by forceps, are found to be tough and horny outgrowths from the mucous membrane, very difficult to detach from their position.

Their irregular distribution and disposition irresistibly remind one of gravestones in a country churchyard. Fortunately, there is nothing so gloomy in their significance. The disease is insidious and persistent, but apparently of no importance. Treatment has no effect upon it; even the removal of the tonsils is only followed by the reappearance of the keratosis in the tonsillar fossa.

Its only interest lies in the diagnosis. It is distinguished from lacunar tonsillitis by chronicity and apyrexia, and by the fact that its spots consist of tough projections; and from diphtheria by the absence of any coalescence or confluence of the disease-spots.

Keratosis has been seen in the larynx giving rise to hoarseness and pain.

NEUROSES OF THE PHARYNX

Sensory.—**Anæsthesia of the Pharynx** is—

1. *Bilateral*, in diphtheritic paralysis, in hysteria, bulbar paralysis and insanity. Hysterical anæsthesia is the most common form.

2. *Unilateral*, from hysteria, or from interference with the glosso-pharyngeal nerve by tumour, etc., in which case it is accompanied by symptoms due to loss of function in the parts supplied by this nerve.

Hyperæsthesia and Paræsthesia of the pharynx are very common. The patients are generally sufferers from hysteria or neurasthenia. The **globus hystericus** is the most typical hysterical paræsthetic condition, but all kinds of feeling may be referred to the throat by hysterical or nervous people.

Diagnosis.—Every care must be taken to exclude organic disease in the supposed functional neuroses of the pharynx. Incipient phthisis or malignant disease may be responsible for the perverted sensation, and all patients with such a symptom must be examined so as to exclude these diseases. It is a wise rule always to make an œsophagoscopic examination in women with paræsthesia pharyngis.

Further, in a certain number of cases the sensation seems to be due to enlargement of the lingual tonsil. At all events, it is not infrequently

removed or relieved by the application of the cauterly to this area. (See p. 639.)

Treatment.—The *anæsthesia* of diphtheritic paralysis is treated according to directions already given (p. 42).

Anæsthesia from bulbar paralysis, being combined with motor paralysis, is associated with imperfect deglutition, and the food is apt to enter the air-passages and to set up pneumonia. In this condition the patient must be habitually fed through the stomach-tube.

For the *paræsthesia* of nervous people general treatment alone should be adopted. Operative procedures on the pharynx are harmful as a rule, save in the reflex conditions which are clearly due to hypertrophy of the lingual tonsil, in which case that disease should be treated. (See p. 638.)

If a patient is convinced of the presence of a fish-bone or other foreign body in the pharynx, it is legitimate, sometimes, to provide such a body for his satisfaction. Cure may follow.

If, after thorough examination repeatedly carried out, no organic basis is found for the sensation, the patient should be told that his disease is neither cancer nor tuberculosis, as the fear of these diseases is often responsible for the *paræsthesia*.

Motor Paralysis of the soft palate is most commonly due to diphtheria (p. 39.) It may also be produced by some interference with the nuclei of the vagus and spinal accessory nerves in the medulla, as in tabes, bulbar paralysis, tumours and apoplexy of the medulla, and syringo-bulbia; or by a lesion, such as a gumma, syphilitic meningitis, or a neoplasm, commanding the nerves at the base of the brain, in the jugular foramen, or in the neck.

The Jugular Syndrome, or the *Hughlings-Jackson-Mackenzie Syndrome*, are names sometimes given to combined paralysis of the vagus, glosso-pharyngeal and spinal accessory nerves. It is produced, as we have just remarked, by lesions about the jugular foramen, but it may be due to simple neuritis, especially after influenza, and we have already referred to it as a rare complication of quinsy. Clinically, it manifests itself in one-sided paralysis of the soft palate, larynx, sterno-mastoid and trapezius. The hypoglossal nerve is also occasionally affected.

A paralysis which is myopathic arises from inflammatory lesions of the pharynx; probably, also, the temporary paralysis of the soft palate that occasionally follows tonsillectomy is also myopathic in origin. (See p. 68.)

Paralysis of the soft palate occurs sometimes also in *myasthenia gravis*, and the complaint usually made is that the voice becomes nasal after a long spell of talking, or when the patient is tired. It may be the first indication of that disorder.

Functional paralysis of the soft palate is occasionally seen, but it is very rare.

The belief that peripheral facial paralysis produces paralysis of the soft palate is no longer credited.

Symptoms.—The patient speaks through his nose (rhinolalia aperta), and solids are more easily swallowed than liquids, the latter returning through the nose. The patient cannot forcibly expel his breath from the lips as in whistling, and if a smoker, has difficulty in “drawing” his pipe.

The interference with the deglutition may cause frequent choking attacks from liquids finding their way into the larynx.

On *examination* in *bilateral* paralysis, the soft palate is seen to be immobile, remaining flaccid when the patient phonates “Ah,” and when the back of the pharynx is touched.

In *unilateral* paralysis attempted movement drags the paralysed side, and with it the uvula towards the sound side.

Prognosis depends upon the cause. The diphtheritic and inflammatory types get well. Bulbar pharyngeal paralysis, on the other hand, is of evil import, as it marks the terminal stage of that affection.

The *Treatment* of pharyngeal paralysis is applied to the cause.

When liquids return through the nose, the food given should be thick. If there is coughing and spluttering even with solid food, feeding by the mouth is dangerous and the nasal tube must be employed. Should laryngeal anæsthesia be present, the only safe course to adopt is to feed *per rectum*. (J. D. Rolleston.)

Spasmodic Neuroses.—Pharyngeal *tonic spasm* occurs in tetanus and hydrophobia. Otherwise it is functional.

Clonic spasm of the palate and pharyngeal wall with contractions, repeating themselves from 60 to 160 times a minute, is sometimes seen. It has been reported as occurring in softening of the brain. Treatment is of no avail.

For *Diseases of the Lingual Tonsil and Base of the Tongue*, see p. 638.

CHAPTER IV

EXAMINATION OF THE LARYNX AND LARYNGEAL TECHNIQUE

LARYNGOSCOPY

There are four methods of inspecting the larynx, one indirect with the laryngeal mirror, and three direct, namely—with the tube-spatula; with the directoscope; and by suspension. As the indirect is the most commonly employed, we shall describe it first and most fully.

Indirect Laryngoscopy.—Use the largest laryngeal mirror the patient will tolerate (Fig. 31). Sitting opposite to him, ask the patient, who is to be seated well back into his chair, with the upper part of his body leaning slightly forward, to open the mouth and put out the tongue. Wrap one or two folds of fine cotton or linen round the point of the tongue, and hold it between



FIG. 31.—Laryngeal Mirror.

the finger and thumb of the right hand, resting the other fingers of that hand on the patient's chin. Do not pull on the tongue, nor hold it so far down that it rubs on the lower incisor teeth. Direct the rays of the light from your forehead-mirror into the patient's mouth; then, holding the laryngeal mirror in the left hand, warm it by plunging it in hot water, or by holding it face downward over a spirit lamp or Bunsen gas flame. Test the heat of the mirror by placing its back against the back of the hand holding the tongue. Ask the patient to breathe through the mouth, and to keep his eyes fixed on your face. Insert the warm mirror, face downward, into the mouth without letting it come into contact with the tongue; carry it back until it reaches the base of the uvula. Keeping the mirror in the middle line, and while the patient is drawing deep, easy breaths, push the soft palate upwards and backwards, until it almost touches the posterior pharyngeal wall. Then, without attempting to observe anything, withdraw the mirror, in order to give the patient a rest, and after a few moments, having again warmed it, reinsert it as before. The image in the mirror, while it is in the position just

indicated, will be the base of the tongue and the tip of the epiglottis. Raise the handle so as to lower the mirror somewhat in the pharynx, alter the direction of the plane of the reflecting surface to a more open angle, at the same time carry the handle to the side of the mouth, and you will obtain, in most cases, a full view of the interior of the larynx. At this moment it is advisable to ask the patient to phonate (to sing "E-e-e")* in order to distract his

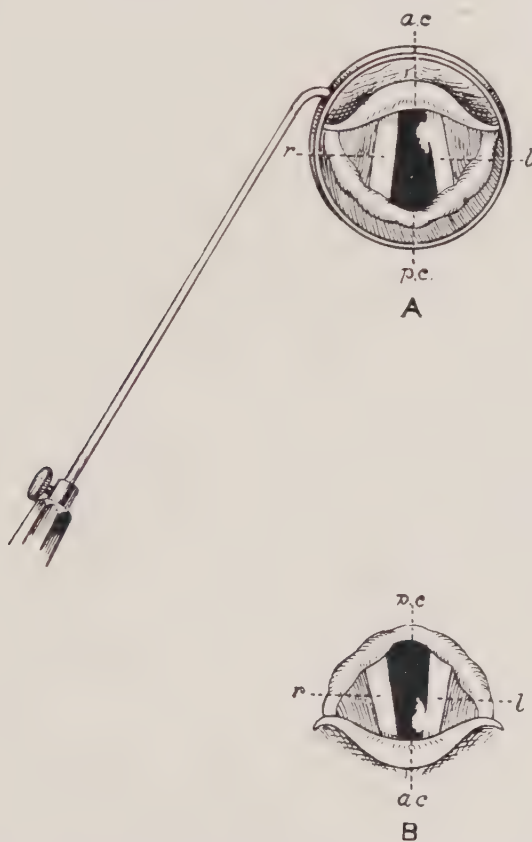


FIG. 32.—Indirect Laryngoscopy (from Morell Mackenzie's 'Diseases of the Throat and Nose').

A, The image reflected in the mirror of B, the larynx.

a.c. The anterior commissure.

p.c. The posterior commissure.

r. The right vocal cord.

l. The left vocal cord, upon which a neoplasm is figured.

attention at a critical moment, and to enable you to find your landmarks by catching sight of the vocal cords as they come together. The patient should be directed to alternate phonation and inspiration for a few times. By doing

* The patient under these conditions cannot say or sing "E-e-e," but in his effort to do so he says "Eh," and that is the sound we wish to obtain. Do not let him say "Ah."

so the movements of the cords are most plainly made visible. Remember that you are looking at an inverted image, and that the right side of the patient is on your left. (Fig. 32.)

The difficulties one encounters in practising laryngoscopy are nearly all surmounted as one gains command over the instrument. A calm and confident bearing, free from fussiness and irritability, is the best method of reassuring a nervous patient. It frequently happens, however, that hypersensitiveness of the fauces and a tendency to gagging and retching render the examination impossible, even in the case of a calm patient. This reflex irritability may be overcome by spraying a 10 per cent. solution of cocaine, mixed with an equal quantity of sol. adrenalin 1-1000, over the fauces and base of the tongue. Again, a pendant epiglottis, lying over the larynx like



FIG. 33.—Escat's Epiglottis Retractor.

a half-closed lid—a not infrequent condition—may conceal the interior. This difficulty may be avoided by placing the mirror as far down and back in the pharynx as possible. If this manoeuvre fails, one may employ an epiglottis retractor, the ends of which are placed in the vallecule, and, when pulled upon, drag up the epiglottis. A convenient method of retaining the epiglottis in this position for operating purposes is to pass a stitch through it by means of Horsford's epiglottis needle (Fig. 42), and have it held by forceps. Again, many people when sounding "Eh-h-h" cannot do so without arching the tongue, and this, of course, shuts off all view of the mirror. If you cannot teach the patient to keep his tongue flat when phonating, ask him to hold his tongue himself, or get an assistant to do so, while with the hand thus disengaged you hold down the tongue by means of a tongue-depressor.

Laryngoscopy should be practised on healthy people, not only because it is necessary to become perfectly familiar with the normal appearances, but also because when the larynx is diseased, examination with the laryngeal mirror is almost always more difficult than in health.

People not infrequently come before us in whom the laryngeal reflex is so sensitive that examination with the laryngeal mirror is impossible, even after using cocaine. In such cases potass. brom. in gr. x doses three times a day for a few days will reduce the irritability to a manageable degree. On the other hand, in cases that have to submit to frequent examination extraordinary tolerance of the mirror is soon acquired. This applies even to children. In infancy, of course, it is impossible to practise indirect laryngoscopy, but at this time of life the direct or the suspension method may be used.

The Normal Image.—(Fig. 34.)

After studying the base of the tongue, with its lingual tonsil and veins, bounded in front by the V of the circumvallate papillæ and the foramen cæcum, note the central glosso-epiglottic ligament, or frænum of the epiglottis, the right and left vallecule, or glosso-epiglottic fossæ, and the right and left lateral glosso-epiglottic ligaments, bounding these fossæ laterally. Next,

direct your attention to the epiglottis, which is the first feature to attract the eye in laryngoscopy. The epiglottis varies much in position and shape in different individuals, but one can almost always see both the anterior and posterior (or buccal and laryngeal) surfaces. Next, the pearly white or pale pink vocal cords readily catch the eye. During quiet breathing they appear some little distance below the epiglottis, diverging as they pass backwards to their attachments to the arytenoid cartilages. They form thus a **V**, the anterior angle of which is known as the anterior commissure.

Towards the upper part of the image note the arytenoid eminences, marking the small cartilages of Santorini which surmount the arytenoid cartilages proper. From the arytenoid eminence on either side to the epiglottis runs the ary-epiglottic fold, in which may be seen the elevation caused by the cartilage of Wrisberg. The ary-epiglottic folds are continued posteriorly into the mesial interarytenoid membrane. While in the position of rest, this membrane, which encloses the interarytenoid muscle, is taut; during phonation the approximation of the arytenoid cartilages by the contraction of the interarytenoid muscle throws it into folds.

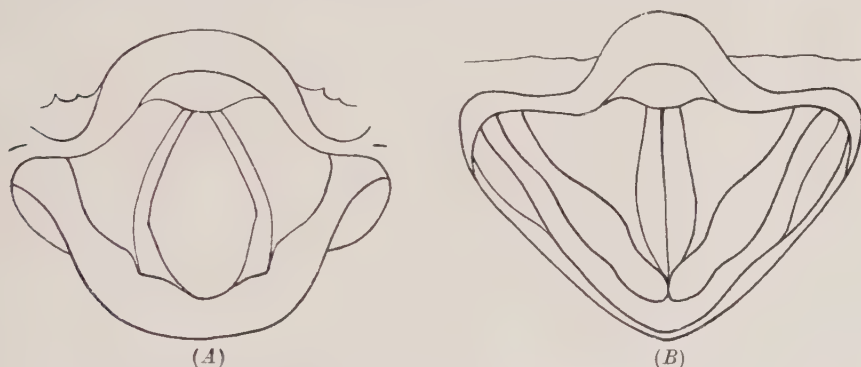


FIG. 34.—The Laryngeal Outline.

A. During Respiration (Abduction).

B. During Phonation (Adduction).

Clinically, the larynx is divided into three portions:—

1. The supraglottic space, above the ventricular bands;
2. The infraglottic space, below the vocal cords, to the lower border of the cricoid cartilage; and
3. The glottis, which comprises the vocal cords and the ventricular bands, including the ventricles.

The space between the vocal cords is the chink of the glottis (*rima glottidis*), ever changing in shape and size with the varying positions of the cords. Study the position of the vocal cords during quiet breathing (abduction), deep inspiration (full abduction), and phonation (adduction). In what is known as the "cadaveric position," the cords occupy a position a little internal to that which they occupy during quiet breathing. In phonation the cords are approximated (adducted) until the space between them is represented by a single line. During quiet respiration they lie between adduction and full abduction, approaching to the position of full abduction, which is assumed when the patient draws a deep breath. In appearance the cords are flat, with smooth surfaces and clean, even edges. External and parallel to the

true vocal cords, and sloping upwards so as to form the lateral walls of the glottis, are the ventricular bands, or false vocal cords. Lying between the ventricular bands and the inner surfaces of the alæ of the thyroid cartilages is a small space, the sacculus laryngis, or ventricle of Morgagni, the opening of which may be seen between the vocal cords and the ventricular bands. One or more of the rings of the trachea can frequently be seen through the chink of the glottis, and very occasionally the division of the trachea into right and left bronchus is visible.

Observe the colour of the different constituents of the larynx: the epiglottis is yellowish, the vocal cords pearly white or pale pink, while the rest of the larynx varies from red to pink.

Abnormalities in Colour.—*Pallor* of the laryngeal mucous membrane will be found if the patient is suffering from anæmia. A definitely localized anæmia of the larynx, while the patient seems otherwise well coloured, raises the suspicion of phthisis.

Hyperæmia.—Apart from diseased conditions, nearly all of which induce a deepening of the colour of the larynx and a reddening of the cords, hyperæmia may arise from such simple causes as prolonged phonation, excessive coughing and the inhalation of irritating substances.

Next observe in detail the **Epiglottis**. The epiglottis may be partly or wholly absent, generally as a result of old syphilitic ulceration.

Ulcers on the epiglottis may be syphilitic, tuberculous, lupoid or cancerous. In the early stages of syphilis, mucous erosions of the epiglottis may appear, accompanying mucous patches in the mouth, fauces and pharynx. Gummata breaking down form large, deep ulcers, generally on the tip or upper edge of the epiglottis. These ulcers may cause pain on swallowing, but the pain is slight in comparison with their size. They are usually large, irregular in outline, and solitary, and are surrounded by an areola of hyperæmia.

Tuberculous ulcers, formed by the disintegration of pale, smooth tubercular swellings, are, in the early stages at least, multiple. They are small, shallow and circular, and occur chiefly on the laryngeal surface or upper edge of the epiglottis. The surrounding mucous membrane is pale. Pain is a marked feature. Later on, these small ulcers coalesce, and, becoming deeper, expose the underlying cartilage, which undergoes necrosis.

The lupous ulcer is preceded by the deposit of lupous nodules.

Epitheliomatous ulcers on the epiglottis are uncommon, save when the organ is attacked by extension from neighbouring parts. Cysts are not uncommon. Papillomata and other neoplasms are rare.

Inspect the **Aryepiglottic Folds** for mucous patches, gummata, and syphilitic ulcers, for tuberculomata and tuberculous ulcers. The movements of the folds may be impaired by œdema, or by chronic inflammatory thickening in chronic laryngitis, tubercle, lupus or syphilis. The anterior aspect of the **Interarytenoid Region** is a favourite site for a tuberculous deposit. Indeed, the first sign of laryngeal tuberculosis is often to be found here. It appears as a slight elevation of the mucous membrane of a somewhat pale tint; this, after a time, breaks down and forms an ulcer, which frequently presents exuberant granulations (see p. 128). A pale, œdematous-looking swelling or fullness of the arytenoid eminences is also an appearance highly suggestive of tuberculosis. The interarytenoid region is a favourite site also for the growth of these warty excrescences which characterize the pachydermatous

or hyperplastic variety of chronic laryngitis, and it may therefore be difficult to decide whether the condition is pachydermia or tubercle.

When the view of the cords themselves is obscured or obstructed, information as to their mobility may be obtained by observing the movements of the arytenoid cartilages, which approach each other and recede with the adduction and abduction of the cords.

The **Ventricular Bands** may be swollen and red from inflammatory conditions. Their inner edge provides a favourite site for superficial ulcers in the secondary stage of syphilis. The ventricular bands take part, of course, in general laryngeal œdema, but if œdema is limited to them, the cause is probably tuberculosis, which frequently affects these parts or the enclosed ventricles. The ventricular bands may be the seat of tumours—polypi, papillomata, fibromata, and not infrequently epithelioma begins in these structures.

The **Vocal Cords** are examined—(1) as to their colour and shape; (2) as to their position at rest and when moving. Note any departure from the normal in either respect.

Note if the cords are inflamed or thickened, if the edges are rough, or seem ulcerated. Observe particularly the existence of warts or growths, and whether there is in such cases any impairment in the free movement of the cords. The neighbourhood of the vocal processes is frequently the site of small growths or protuberances. If the movement is impaired, notice whether one or both cords are affected. What position—adduction, the cadaveric position, abduction, or full abduction—does the affected cord take when at rest? If the true cords do not meet on attempted phonation, do the ventricular bands come together in a vicarious attempt to produce sound? Do the cords, during phonation, come into contact along the whole or only part of their free edge?

After the examination of the cords is completed, make the patient take some deep breaths, and direct your attention to the subglottic and tracheal regions. Subglottic tumours and deviations and stenosis of the trachea can frequently be seen in laryngoscopy.

Finally, the hyoid fossa of either side and the deep lateral pharyngeal wall can be brought into the field of view by inclining the patient's head first to one shoulder and then to the other, while the mirror is maintained in its original position relative to the horizon. In this locality, epithelioma sometimes begins, and here also foreign bodies occasionally lodge.

Direct Laryngoscopy is the examination of the larynx by direct vision unaided by a mirror in the pharynx. There are three methods of direct examination; first, that by means of the laryngeal tube-spatula of Brunings or Chevalier Jackson; secondly, that by means of the directoscope; and and thirdly, that by means of suspension laryngoscopy.

Direct Laryngoscopy by Means of the Tube-Spatula.—There are two types of spatula in use: Brünings', which carries the illuminating lamp in the handle, and Mosher's, which carries its lamp at the distal end of the tube (Fig. 35). Both are introduced and used in the same way.

Method.—In adults the examination is made under local, in children under general anæsthesia. Under local anæsthesia the patient is seated,

either in a very low chair, or in what is known as Mouret's position—that is, astride a chair and facing the back of it, with the body bent forward at the pelvis. Under general anæsthesia the patient is laid on his back, with the head on a level with the body, or slightly raised, and turned towards the operator, who stands on the right side of the table, or the head is fully extended on the table.

The tube having been warmed and lubricated, it is passed over the tongue either in the middle line, or what is often more suitable, from one or other angle of the mouth, under the direct vision of the operator looking into the tube. The first object seen is the uvula, and whenever it becomes visible, the handle of the tube should be raised. This brings the lingual aspect of

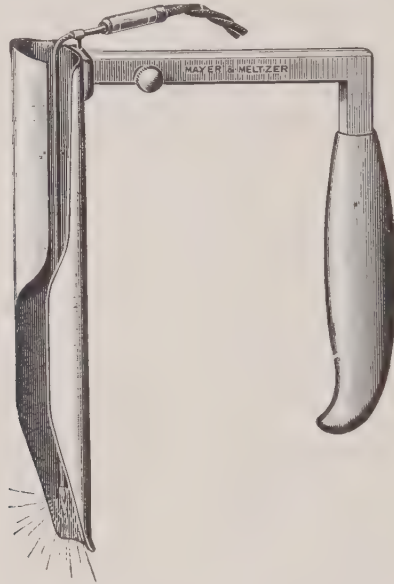


FIG. 35.—Laryngeal Tube-Spatula (Hill's modification of Chevalier Jackson's).

the epiglottis into view, and, always under inspection, the end of the instrument is then pushed gently over the tip of the epiglottis, while the handle is carried still further up, and with it the patient's head undergoes some extension. At the same time, the tube-spatula, making firm pressure on the epiglottis and dorsum of the tongue, brings into view, first the arytenoid region and posterior segment of the larynx, and then the whole length of the cords from back to front, including the anterior commissure. (Fig. 36.) We are now looking through a short, straight and relatively wide tube directly into the larynx, and through the larynx between the cords we can see into the trachea as far down as the carina. When the trachea and bronchi have to be explored, as in bronchoscopy, a longer, finer tube is used, but the first act of its insertion is the same as that we have just described for direct laryngoscopy. (See p. 183.) At present we are only concerned with laryngoscopy.

The *Direct View* of the interior of the larynx differs considerably from the indirect view as seen in the laryngeal mirror. The parts seem much nearer and more accessible, and one obtains a clearer notion of the relative distances. Anatomically, of course, the features are the same, although they do not appear to be of the same shape and colour. The cords, for example, seem to have become more pink and thicker. The image appears to be upside down compared with the conventional indirect image.

Difficulties.—Irritable and aged patients with short, thick necks are difficult to examine. And prominent teeth with a small buccal orifice render direct examination arduous and sometimes indeed impossible.

In children under a general anæsthetic, the continual flow of saliva and mucus interferes with the view, and calls for constant swabbing and sponging. But this can often be avoided by an antecedent hypodermic injection of atropin (gr. $\frac{1}{200}$).

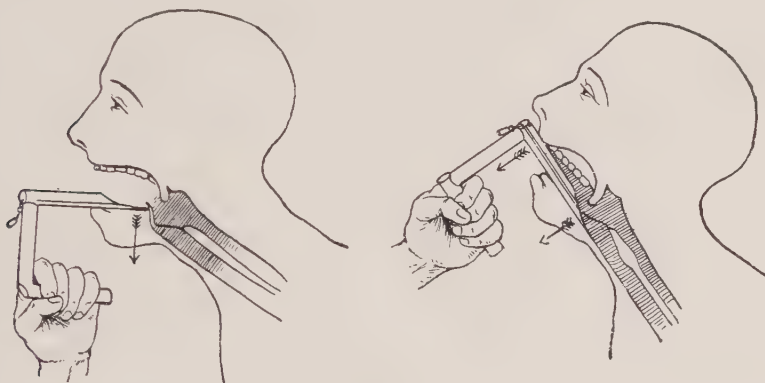


FIG. 36.—Direct Examination of the Larynx (from Chevalier Jackson's 'Peroral Endoscopy').

The direct method in adults is, for the most part, employed for operative procedures. It does not take the place of indirect laryngoscopy for examination and diagnosis, although, as a matter of fact, a doubtful diagnosis may often be cleared up when the larynx is examined directly. It is otherwise in infants and little children, in whom examination with the laryngeal mirror is impracticable. At such early periods examination with a tube spatula of suitable size is the only method, apart from suspension laryngoscopy, of inspecting the larynx. It is performed under a general anæsthetic, or, indeed, without any anæsthetic at all. Cocaine is dangerous in infancy.

The Directoscope (Fig. 37), invented in 1923 by Haslinger of Vienna, is of great use and has already been widely adopted.

It consists of two spatulæ opening like a duck's bill, one for the tongue (Fig. 37, z) and one for the pharynx (R). At the end of the latter is a hinged plate (P). The spatulæ are actuated by means of a winged screw (F), while the hinged plate can be pushed forward by a long rod (Y). The handle (C) can be attached to either the upper or the lower part of the instrument according as the patient is sitting up, or lying down (as in suspension). In Fig. 37

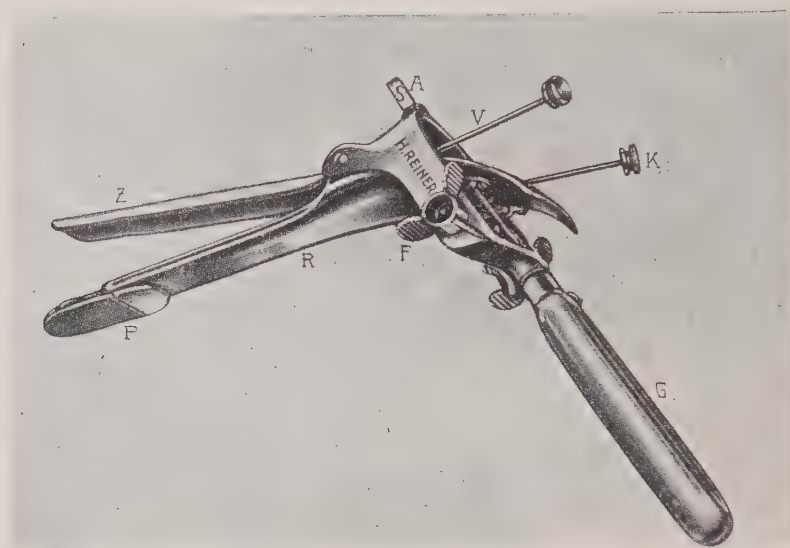


FIG. 37.—The Directoscope. (From G. Russ Wood.)

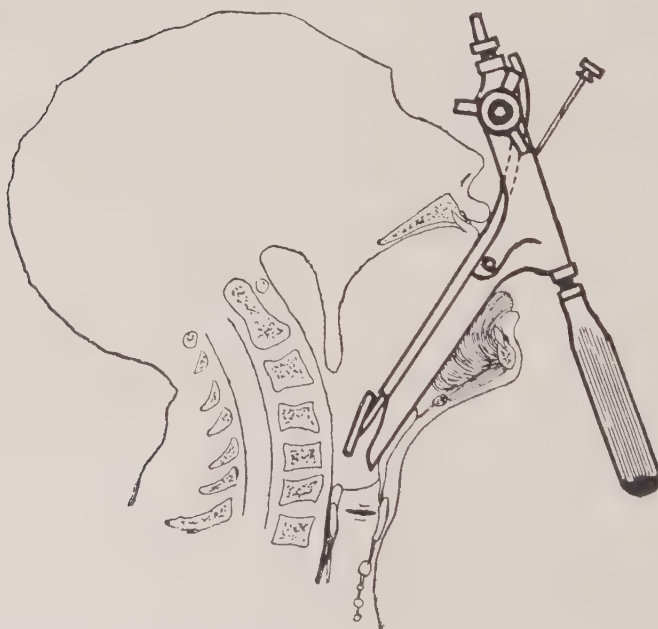


FIG. 38.—Insertion of Directoscope. First step. (From G. Russ Wood.)

the handle is attached for use in the latter position. In Fig. 38 the handle is changed as the diagram represents the patient's head when he is seated. Illumination may be provided by a head-mirror or by an electric bulb attached to the instrument.

Method.—Local or general anæsthesia may be employed. The two spatulæ are closed and the advancing rod that moves the hinged plate is fully drawn back. The patient's mouth is opened and the spatulæ passed, the tongue spatula being next the tongue, up to and over the epiglottis. (Fig. 38.) When the arytenoids come into view, the advancing rod is pushed home so as to slide the hinged plate into the hypopharynx (Fig. 39.) Then the

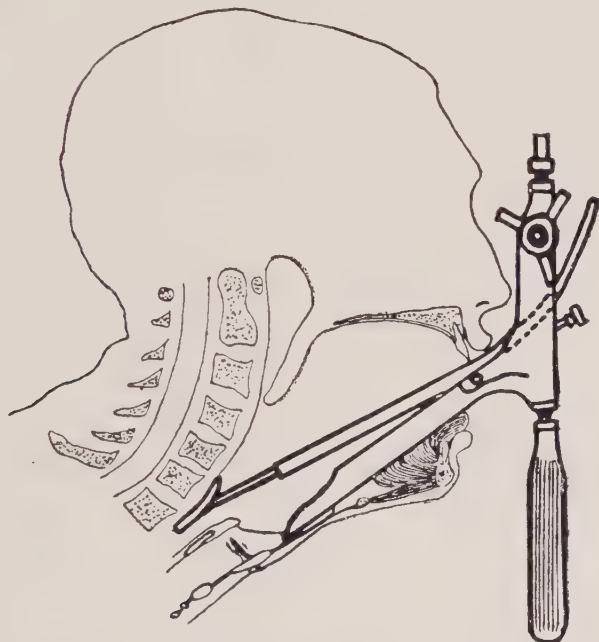


FIG. 39.—Insertion of Directoscope. Final Step. (From G. Russ Wood.)]

winged screw is turned so as to separate the extremities of the spatulæ. As they diverge the hinged plate fixes itself against the vertebral column in the laryngo-pharynx, and the tongue-spatula, pressing forward the base of the tongue, exposes to view the interior of the larynx. (Fig. 39.)

The instrument is self-retaining, so that the surgeon can use both hands. It can be removed by closing the spatulæ. There is no need to pull back the hinged plate.

Suspension Laryngoscopy (see Fig. 40) is an ingenious method of exposing the interior of the larynx to view, which we owe to Killian.

A special apparatus is necessary, consisting of a "crane" clamped to the operating table, and depending from the crane is a "suspension hook," with mouth-gag, gutter tongue-spatula, and epiglottis elevator.

The patient lies on his back on the operating table, at the head of which the surgeon is seated. The head of the patient, supported by an assistant or on a special support, is over-extended over the end of the table. The surgeon,



FIG. 40.—Suspension Laryngoscopy—Hook and Tongue Spatula.

taking the prepared suspension hook in his left hand, inserts the spatula into the mouth with the gag closed. Having adjusted the tongue-spatula so as to lie on the tongue, which in this position is uppermost, the gag is fitted to the incisors. The end of the tongue-spatula should reach as far as the

glosso-epiglottic fossa. The suspension-hook is now hung on the crane, for which a little adjustment may be necessary, and as this suspends the head, the assistant or his surgeon may release his support of it. The gag is now screwed open, and a ray of reflected light from the forehead mirror thrown into the pharynx shows the epiglottis. The long epiglottis spatula is next inserted and carried over the epiglottis, so as to raise that structure out of

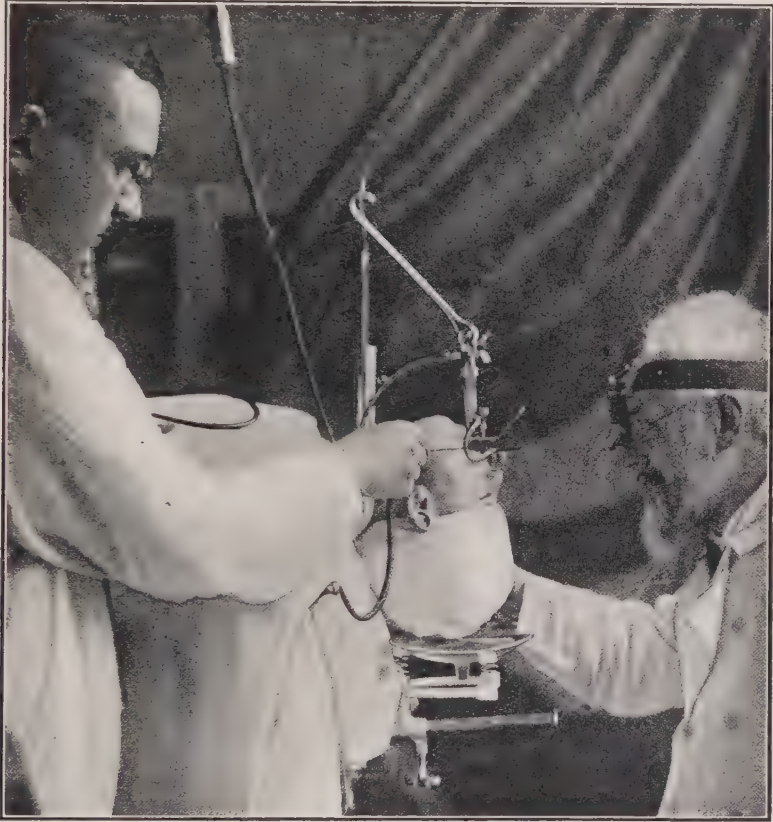


FIG. 41.—Suspension Laryngoscopy (Killian's).

the way, and the spatula is then fixed in position by its screw. A few turns of the adjusting screw on the hook will now bring the vocal cords into view, and it is then possible, by means of long probes and forceps, to investigate the interior of the larynx under direct vision. (See Fig. 41.)

Suspension laryngoscopy is chiefly used for the examination and treatment of the larynx in infancy and childhood, and by its means we are able to undertake bimanual manipulation of the larynx. In infancy its use necessitates a general anæsthetic.

External Examination of the Larynx.—No clinical examination of the

larynx is complete without an inspection and palpation of the laryngeal cartilages from without. Many cases also will require an examination of the lungs, heart, and central nervous system.

THE TECHNIQUE OF LARYNGEAL THERAPY.

LOCAL ANÆSTHESIA.

For the ordinary indirect examination of the larynx no anæsthesia is, as a rule, required, although a slight spraying of the fauces with 10 per cent. sol. cocaine is sometimes necessary. But the pharynx may be so irritable that even free swabbing with the anæsthetic is insufficient to enable the laryngeal mirror to be held in position.

In such cases, and generally when operative measures are to be undertaken, as in the removal of growths from the larynx, the patient should receive 10 gr. potass. brom. three times a day for two or three days—if time can be obtained—and immediately before the *séance* is begun a suitable dose (gr. $\frac{1}{4}$ to $\frac{1}{3}$) of morphia and atropin (gr. $\frac{1}{150}$ to $\frac{1}{100}$) hypodermically may be given.

The **Routine Local Anæsthetization** of the larynx is gone about as follows :

A mixture of equal quantities of 10 per cent. sol. cocaine hydrochlor. and sol. adrenalin (1 to 1000) is prepared. Under inspection and illumination a throat swab charged with the solution is passed into the pharynx and applied to the glosso-epiglottic fossæ. In a few minutes the application is repeated, and at the same time the faucial pillars, soft palate and uvula are painted. After another short interval these parts are again swabbed, together with the posterior pharyngeal wall. The patient should avoid swallowing the solution. (See also p. 18.)

Next, a laryngeal syringe is filled with the solution, and under inspection with the laryngeal mirror the point of the syringe is introduced over the base of the tongue and over the tip of the epiglottis. While in this position a few drops of the cocaine solution are made to trickle down the epiglottis as down a gutter into the interior of the larynx, where the coughing it sets up distributes the anæsthetic freely over the mucosa.

Two or three of such applications suffice to render the larynx anæsthetic. But before starting any manipulation, the laryngeal probe should be passed into the larynx, and its sensibility tested.

The anæsthesia lasts about twenty minutes, and is sufficient for all minor operative measures.

Passing Laryngeal Instruments by the Indirect Method. The rectangular laryngeal curve renders it advisable to pass these instruments on the flat through the mouth as far as the pharynx, and then to turn the handle and point into the middle line. This is done, of course, under the guidance of the laryngeal mirror.

In operations such as the indirect removal of small neoplasms, many difficulties arise from the nervousness and irritability of the pharyngeal reflexes, but these can be overcome with patience, bromides, or a hypodermic of morphia previous to the examination, together with careful local anæsthetization of the parts.

When a pendent epiglottis obstructs the laryngeal orifice like the half-closed lid of a box, a suture may be passed through it by means of C. Horsford's

epiglottis needle-holder (see Fig. 42), the ends of the suture being brought out of the mouth and held by pressure-forceps. The weight of the hanging forceps is sufficient to hold the epiglottis forward.

Considerable manipulative dexterity and practice are necessary to become expert at passing laryngeal instruments, and the student should lose no opportunity of acquiring this accomplishment. (See also p. 144.)

By the **Direct Method**, straight, long instruments are used, with a rectangular bend at the proximal end of the instrument. (Figs. 51 and 52.) This method is more precise than the older method, but the laryngologist must learn to practise both, as there are some patients in whom the use of the direct laryngeal and other tubes is a matter of great difficulty.

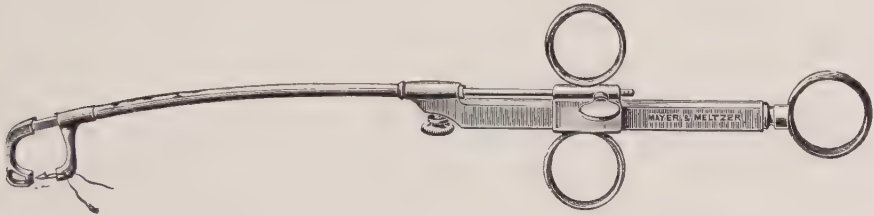


FIG. 42.—Horsford's Epiglottis Needle.

The passage of the laryngeal swabs, the application of astringents and of the galvano-cautery point to the interior of the larynx do not introduce any new principle, and require no particular description.

Hypopharyngoscopy.—The following manœuvre, which opens up to the view by the laryngeal mirror the upper part of the laryngo-pharynx, is known by this name. It is practised when there is any reason to suspect disease of the lower pharynx.

After the larynx has been anæsthetized, a rigid metal probe, guarded by wool wound round the point, is passed under indirect inspection into the larynx as far as the anterior commissure of the cords. By applying steady and forcible traction on the probe, the whole larynx can now be pulled forward away from the posterior wall of the deep laryngo-pharynx, a considerable portion of which is thus made visible in the mirror. Carefully and steadily practised, the method is harmless.

CHAPTER V

AFFECTIONS OF THE LARYNX

FRACTURES AND INJURIES

Fracture of the Hyoid Bone is usually the result of direct violence, as in strangling or hanging. The body or one of the cornua may be broken.

Symptoms.—There is pain on moving the neck, jaw and tongue, and in speaking. The deformity can be felt on palpation, and may be visible in the laryngeal mirror. If the mucous membrane is torn, bleeding into the larynx may occur with hæmoptysis. Œdema of the glottis is liable to supervene.

Treatment.—The patient is kept in bed, and fed on liquids. Displacement may be rectified manually. If glottic œdema leads to dyspnœa, tracheotomy may be necessary.

Contusions of the Larynx from blows received in boxing or from falls across ropes or other obstacles are not uncommon. There is considerable pain, and the subperichondrial effusion may be evident in the interior of the larynx as well as externally.

But deformity and swelling are more usually noticed when **the thyroid cartilage is fractured**—a serious condition, as it is apt to produce obstruction to the airway either by effusion and swelling in the interior of the larynx, or by the fragment of the broken cartilage becoming displaced.

Symptoms.—The history of the accident is usually clear. Locally, there is pain, tenderness on pressure, swelling, ecchymosis, dysphagia, and sometimes, as has been said, dyspnœa. Hæmoptysis also may occur. Emphysema of the neck is a rare but grave phenomenon.

Examination with the laryngeal mirror shows intralaryngeal swelling, purplish if due to extravasated blood, and pallid if the larynx is œdematous. Sometimes considerable deformity of the interior of the larynx is evident, as when there is fracture with displacement, and the vocal cord on the affected side is immobilized.

Prognosis.—Fracture of the larynx is a grave injury, no fewer than 70 to 80 per cent. of cases proving fatal. (T. F. Mullen, 'Annals of Surgery,' vol. lxxx, p. 660.) Moreover, as serious symptoms may arise at any moment, no case can be regarded as out of danger until quite well. Recovery, when

it occurs, may be incomplete—that is to say, permanent alteration of the voice may be the consequence.

Treatment.—If there is any dyspnœa; if, shortly after the accident, swelling seems to be rapidly forming; or if there is emphysema, tracheotomy should be at once performed, as urgent symptoms may appear with suddenness, and the patient die from asphyxia before he can be relieved. After tracheotomy, operative exposure of the fractured cartilage and suturing of the fragments in position may be resorted to. Otherwise, the pain of simple contusion or uncomplicated fracture may be eased by hot fomentations.

The patient should be kept at rest, and should refrain from using the voice until the pain and swelling subside. In the severer cases rectal feeding is sometimes necessary.

Fractures of the **cricoid** and **multiple** fractures of the larynx are usually due to severe blows or wounds, and are often associated with injury to the large blood-vessels; they are therefore often rapidly fatal.

Wounds of the larynx are generally the result of war-injuries, such as bullet-wounds, or of attempts at suicide by cutting the throat.

Bullet-wounds of the larynx, if severe or extensive, so that large vessels are divided, are usually rapidly fatal from hæmorrhage or asphyxia. But if tracheotomy can be promptly performed and the bleeding arrested, the case may be saved.

It is generally with the after-effects that the laryngologist has to deal in the shape of cicatricial stenosis of the larynx. (See p. 180.)

In cut-throat injuries above the hyoid bone, the transverse incision may divide the root of the tongue and sever the lingual, facial, and perhaps the carotid vessels. Apart from hæmorrhage, the danger to life consists in the liability of the epiglottis and tongue to fall back over the larynx, and so to cause asphyxia.

Wounds of the larynx which traverse the laryngeal cartilages may cause death by hæmorrhage or by asphyxia from bleeding into the trachea. If the windpipe is incised or divided, asphyxia may result from its displacement.

The symptoms which appear during the healing of such wounds naturally depend upon their extent and character. Sepsis is common, and the discharges entering the lungs are prone to induce septic bronchitis and pneumonia.

Treatment.—After arresting hæmorrhage, the dyspnœa is relieved by tracheotomy if required, and the wound is sutured in layers, provision being made for drainage.

CONGENITAL LARYNGEAL STRIDOR

This is a form of inspiratory stridor found in new-born infants. Direct examination, as D. R. Paterson and A. Brown Kelly were the first to point

out, shows that the stridor is produced by the vibration of the arytenoid cartilages and ary-epiglottic folds, which are aspirated in towards each other, and, in the severer cases, into the lumen of the larynx during inspiration.

As to the cause of this aspiration there has been much difference of opinion. Sutherland and Lambert Lack refer it to a congenital narrowing



FIG. 43.—Larynx from Case of Congenital Laryngeal Stenosis. Note narrowing of introitus. Natural size.



FIG. 44.—Normal Larynx of Child. To compare with Fig. 43. Natural size.

of the epiglottis and ary-epiglottic folds. John Thomson and Logan Turner, however, hold that the narrowing, which undoubtedly exists in these cases (see Fig. 43), is an acquired deformity "analogous to pigeon-breast," and they suppose the initiating cause to be "an ill-co-ordinated spasmodic action of the muscles of respiration." Finally, the present writer, while believing the deformity to be secondary, refers the aspiration and the consequent stridor to a yielding of the walls of the introitus laryngis by reason of an abnormal feebleness of these parts relative to the muscles of respiration.

Symptoms.—The stridulous noise appears at or shortly after birth, and naturally is a source of alarm to the parents. The sound is of a rough, purring quality, and attends inspiration chiefly, although it may be heard also a little with expiration. It is loudest when the infant is crying or excited. During quiet moments, or while the baby is asleep, it may become entirely inaudible. A certain duskeness, not amounting to cyanosis, may be observed when the noise is at its loudest, and the obstruction induces some intercostal and incisural retraction during inspiration.

In most cases these symptoms continue with little or no change for from one to three years, or even longer. Then they disappear spontaneously.

But there is a variety of the malady in which the clinical picture is very different. In this form the stridor, gentle at its first appearance shortly after birth, gradually becomes more and more loud, until, in the course of weeks or months, it assumes a harsh, disturbing sound, audible, it may be, all over the house. Some authorities, probably correctly, have suggested that the greater laryngeal flaccidity and stridor of these cases are produced by rickety changes. In this variety the stridor may be louder when the patient is asleep, and the respiration is at all times seriously impeded.

Congenital laryngeal stenosis of this severe type may be associated with dysphagia, particularly when the patient is drinking, liquid finding its way into the larynx through its imperfectly apposed aperture, and exciting spluttering and choking.

The *diagnosis* from diphtheria and from croup lies in the history and in the chronicity of the phenomenon. Stridor from an enlarged thymus is principally expiratory.

From papilloma of the larynx the distinction lies in the fact that the congenital stridor dates from birth, whereas stridor from papilloma is acquired later, but a direct examination of the larynx may be necessary to arrive at certainty.

Prognosis.—Of 51 cases recorded in the literature, no fewer than 18 were fatal, but as the reports refer to serious cases for the most part, the general mortality should certainly be represented by a much lower figure. Mild cases recover completely, as has already been said, as the laryngeal framework becomes firm. But even in mild cases, and more so in severe cases, an attack of simple catarrhal laryngitis or bronchitis introduces an element of danger.

Treatment.—Fresh air and sunlight, natural or artificial, are called for to prevent or cure rickets, but no local treatment is likely to be of any avail. In the severer cases oxygen should be at hand to combat any tendency to asphyxia. Tracheotomy is always of doubtful value, and when there is dysphagia it is positively contra-indicated, as after that operation the child can no longer cough out the liquids which enter the larynx during deglutition, and septic pneumonia is likely to supervene.

Congenital Web of the Larynx (Congenital Laryngeal or Glottic Stenosis; Diaphragm of the Larynx).—In this congenital abnormality, which is very

rare, the anterior commissure is occupied by a web or band uniting the cords. It may extend as far as the middle of the glottis and is crescentic in its free edge.

If sufficiently extensive it causes inspiratory stridor from birth or shortly thereafter, resembling in this respect congenital laryngeal stridor. The voice, however, is hoarse, while it is clear, though at times weak, in the latter condition. Most of the cases we encounter, however, are discovered accidentally in adults and induce no symptoms whatever.

On inspection, for which in the infant direct examination is necessary, the web is disclosed. It may appear to be thin and even perhaps semi-translucent, but the apparent "web" is usually but the flat upper surface of a somewhat thick, wedge-shaped mass of tissue.

Treatment.—When discovered accidentally and causing no symptoms—the usual event—it is better left alone. If stridor, dyspnoea, or hoarseness necessitate treatment, the structure may be cautiously destroyed by diathermy cauterization, the terminal being inserted by way of a direct instrument. Simple incision affords only temporary relief, as the web re-forms, and removal through a thyro-fissure opening is no better. After its destruction the glottis should be kept patent by a vulcanite tube of wide calibre inserted as in intubation and worn during the healing of the wound.

ACUTE LARYNGITIS

is most commonly catarrhal in nature, occurring in the course of a "cold," in which case it is due to infection by one of the organisms of acute catarrh.

The inhalation of irritating gases or other vapour or of dust-laden air and the improper use of the voice predispose to, or may even directly induce, the disease. The frequency with which mouth-breathers are the subjects of laryngitis, acute or chronic, should be remembered, and in purulent forms of nasal trouble also laryngitis may arise. Alcoholism, gout and rheumatism predispose to it, and it may also appear in the course of measles, influenza, whooping-cough, smallpox, typhoid or scarlet fever.

The *General Symptoms* in the catarrhal variety are those of a "cold," and in other varieties they depend upon the primary disease.

The *Local Symptoms and Signs* are approximately the same for all, their severity naturally depending upon the degree of inflammation. In the milder cases, hoarseness, dry tickling, painful cough and a sense of local discomfort mark the occurrence of acute laryngeal catarrh, and these gradually lessen and pass off in a few days. In the more severe cases there is complete aphonia, the cough is rough and barking, and if oedema co-exists there will be some stridor. The mirror shows general reddening and swelling of the mucous membrane, which is dotted here and there with mucus. The vocal cords lose their flat, even contour and become rounded, while their pearly-white colour is replaced by the redness of a hyperæmia which varies in intensity with the degree of inflammation. Even in the milder cases imperfect approximation of the cords on phonation will be evident.

In children acute laryngitis is both more frequent and more dangerous than in adults. The danger arises from the relatively narrow chink of the infantile glottis, and from the readiness with which œdema and spasm occur. Respiratory distress and croupy cough are more severe than in adults, and in the evening, or during the night, attacks of grave dyspnœa from glottic spasm may suddenly come on, lasting from a few minutes to several hours. These attacks are generally evanescent, but death from asphyxia may occur. In a child this attack of glottic spasm and acute respiratory distress may be the first symptom of laryngeal inflammation. After the acute dyspnœa passes away, however, the croupy cough and other symptoms of laryngitis remain. This serves to distinguish these attacks of inflammatory croup from the purely spasmodic laryngismus stridulus. A favourable case of acute laryngitis in children runs very much the same course as in adults. After the lapse of a few days the cough, hoarseness and fever disappear, and the child gets rapidly well. Some children, however, frequently evince a predisposition to croup every time they catch a cold—a history which should always lead to an examination for adenoids.

Diagnosis.—The sudden onset and associated symptoms render the diagnosis clear, but in children the possibility of primary laryngeal diphtheria should lead to a bacteriological examination of the secretions if the “croupy” signs continue for any longer than twenty-four hours.

Recurrent attacks of acute laryngitis in adults should lead to an examination of the lungs for tuberculosis, and of the nose for nasal suppuration.

Prognosis.—Acute catarrhal laryngitis being not infrequently the first sign of an acute “cold,” the prognosis is that of the latter—that is to say, it is good in healthy people but less favourable in aged or debilitated patients. (See p. 271.)

Treatment.—A quick cure may be obtained by a hot bath, retirement to bed between blankets and a stay there for twenty-four hours. But this ideal cannot always be secured. In any case, however, the patient should remain indoors for a day or two, and should give to the voice absolute rest.

The local uneasiness is relieved by steam inhalations containing *tc.* benzoin *co.* $\text{m}\times$ to xv to the pint; or *ac.* carbol. liq. mv to the pint of nearly boiling water.

Hot drinks of lemonade, barley-water and gruel are very grateful.

A day or two after the acute symptoms have subsided, the patient is able to go out of doors unless the weather is inclement, but care should be exercised, especially by singers, not to use the voice too early.

If signs of extension into the chest are present, however, further confinement to an equable indoor temperature will be necessary.

A singer with acute catarrhal laryngitis will sometimes demand a voice for immediate use. The usual plan then adopted is to spray some sol. adrenalin (1-5000) into the larynx shortly before the performer steps on

to the platform. But this measure is apt to be followed by severe reaction, and the risk of permanent injury to the voice is considerable.

In children croup requires special treatment. The child is put into a hot mustard-bath and wrapped in flannels. For the paroxysms, a sponge wrung out of hot water and laid on the front of the neck often affords relief. Care must be taken, especially in young infants, to avoid scalding the skin. Internally the emetic action of a teaspoonful of ipecacuanha wine is useful, and after that has passed off, small doses of p. ipecac. co. prove a useful sedative to the irritated larynx. The drug must be administered cautiously, however, as the therapeutic action of opium in children, though valuable, may entail risk. It is unsuited to babies of less than a year old.

If the breathing becomes seriously impeded in children intubation or tracheotomy may be necessary. (See p. 192.)

ACUTE INFLAMMATORY ŒDEMA OF THE LARYNX.

The submucous tissue of the larynx, both above the vocal cords and below them, is looser than it is in the cords themselves, and for that reason these parts are liable, when inflamed, to become so swollen and œdematous as to lead to serious interference with respiration. Although in this process the cords themselves are, as a rule, but slightly affected, it is a mistake to say that they do not become œdematous at all.

The condition is commoner in children than in adults, as it is, indeed, the pathological change underlying genuine inflammatory croup. But it is not unknown in adults, and it is, at any age, a source of danger to the patient.

Ætiology.—Acute inflammatory œdema of the larynx may result from injury—mechanical, thermal or chemical. Of the first an important variety is that caused by the recent aspiration of a foreign body, particularly in children. It induces œdema of the subglottic region. (See p. 202.) Acute inflammatory œdema of the larynx is produced also by an invasion of the tissues by the pneumococcus and other pyogenic organisms, and it is not infrequently secondary to syphilitic, cancerous, or tuberculous laryngeal disease. It is also an associate of septic pharyngitis, Ludwig's angina and similar conditions.

The symptoms are those of acute catarrhal laryngitis—cough, hoarseness and pain on coughing; but there is more constitutional disturbance, while dyspnoea with stridor, more or less severe, is almost always present from the obstruction to the breath-way presented by the swollen and œdematous epiglottis, arytenoid region and glottis. The obstruction may be so great as to cause death by asphyxia.

As we have just seen, acute inflammatory œdema of the larynx may arise in children from simple acute laryngitis, and it forms one of the varieties of "croup." Among other diseases which give rise, both in children and in adults, to what is called "croup," or laryngeal stridor, are

simple (or septic) membranous laryngitis, diphtheria of the larynx, spasm of the glottis and a foreign body arrested in the larynx. (See also p. 180.)

In adults the laryngoscope, in acute inflammatory œdema of the larynx, shows the epiglottis puffed up and swollen out of all resemblance to its normal condition. Instead of being pale, yellow, flat, movable and leaf-like, it is immobile, tense and sausage-shaped, and varies in colour from purplish-red to pale pink. The characteristic translucency of its margins proclaims the distension to be due to œdema. If, as is generally the case, the ary-epiglottic folds, the arytenoid eminences, the interarytenoid region and the ventricular bands also take part in the œdema, the vestibule of the larynx may be so encroached upon by the puffy swelling as to prevent any view of the glottic or subglottic region being obtained.

Occasionally the course of events is such that the œdema shows a travelling tendency, and we may, in the course of a few days or weeks, find it leaving the supra-glottic for the glottic, and then for the infra-glottic region. In adults, at the same time it is usually possible to make out a certain amount of loose œdematous infiltration of the tissues in the neck external to the larynx. The process does not extend to the trachea.

In children, the excitement and general distress of "croup" render it impossible for the surgeon to use the laryngoscope, so the condition of the larynx can only be inferred from the symptoms.

The œdema causes dyspnœa and noisy stridor. If there is any cough, it is rough and "croupy" and the voice is reduced to a whisper.

The dyspnœa varies in degree with the amount of obstruction to the airway in the larynx, but its presence always induces a feeling of anxiety in the patient, and the dyspnœa is, moreover, liable to sudden exacerbations from rapid increase in the exudation or from uncontrollable spasm.

The pulse varies in strength and rapidity according to the nature of the infective agent. When rapid, compressible and "shabby," the outlook is bad, as the case approximates to the Ludwig type. (See p. 43.) On the other hand, if the pulse is not unduly increased, and is of good volume, the chances are favourable—so long as respiration can be kept going.

Diagnosis.—A culture, from the larynx if possible, should, in all cases, be taken in order to exclude diphtheria.

Inquiry should also be made as to the possibility of a foreign body having been aspirated.

That the œdema in adults may be induced by some hidden tuberculous or malignant lesion should never be forgotten, and a search should be made for those diseases after the œdema has subsided. Acute œdema of the larynx may also prove to be the first sign of perichondritis. (See p. 121.)

Prognosis.—As long as the œdema exists there is anxiety, and death may be sudden. The stridor and dyspnœa may manifest considerable fluctuation in severity, but a progressive improvement is a hopeful augury of entire recovery in simple uncomplicated cases.

The pneumonic type may extend to the lungs, setting up broncho-pneumonia, and may thus initiate a prolonged and anxious illness.

Treatment.—When mild, the application of cold packs to the neck, with the sucking of ice, will generally suffice to relieve the symptoms. Sometimes, however, the patient prefers warm applications and drinks.

A throat or laryngeal spray of cocaine (1 to 2 per cent. in water) with an equal quantity of adrenalin solution (1-1000) every two or three hours will help to reduce the swelling.

Even when the disease is mild, preparation should always be made for immediate *tracheotomy*, as the necessity for operation may arise suddenly. In any case, if the stridor is considerable, and especially if it is increasing, the operation should be performed before urgency calls for immediate and hasty interference. (See p. 192.)

Non-Inflammatory Œdema of the larynx is met with in Bright's disease ; as a result of passive hyperæmia from pressure on the veins of the neck ; and sometimes in consequence of the administration of potassium iodide.

The œdema has the same distribution as that met with in acute inflammatory conditions, but the mucous surface is pale instead of red or purplish, as it is in the acute œdema.

The risk of laryngeal œdema when potass. iodid. is administered for syphilis of the larynx is considerable, and prior to the days of the salvarsan drugs, it was often necessary, on that account, to perform tracheotomy before beginning the iodide. One or two preliminary doses of the arsenical agent, however, obviate that necessity. (See p. 83.)

CHRONIC HYPERPLASIA OF THE PHARYNX AND LARYNX

Under this non-committal name is described a rare and peculiar condition of semi-solid infiltration of the submucous tissues of the pharynx and larynx, comparable in some respects with amyloid disease, and histologically resembling the hyperplastic variety of hereditary syphilis. It does not seem, however, to be syphilitic, and indeed its nature is unknown. (A. Brown Kelly, 'Lancet,' April 6th, 1901.)

It produces a general, smooth fullness of the parts and interferes with their movement, but apart from this inconvenience it exercises little or no deleterious influence.

It is extremely chronic, lasting unaltered for years, but it may undergo improvement, and even entirely disappear as mysteriously as it came.

No treatment has any effect upon the condition.

MEMBRANOUS LARYNGITIS

Membranous Laryngitis may be septic or diphtheritic, but the latter is by far the most common. When first seen, these varieties can only be differentiated bacteriologically, and even later on in the course of the disease, at all events in young children, in whom laryngoscopic examination is difficult or impossible, diagnosis from clinical evidence alone should never be made.

In both forms of the disease the signs of local interference are the same—they are those of laryngeal obstruction, together with hoarseness and croupy cough. There is present also constitutional disturbance—headache, fever and prostration. After the first day or two the signs of obstruction become more marked, attacks of glottic spasm come on, and the stridor increases. The child is now said to be “crowing,” and suffering from croup. We should always remember that **croup is not a disease : it is only a symptom.** In membranous laryngitis, however, croup is a more marked symptom than in any other form of laryngeal disease.

The constant and distressing cough—which, when paroxysmal, is apt to pass into spasm—the dyspnoea and lividity, the constant tossing about of the child in its frantic efforts to obtain more air, the clutching at the throat, and, as time goes on and no relief to the obstruction is afforded, the gradual onset of lethargy and at last of coma from carbonic acid poisoning, unite to form one of the most distressing sights a doctor can be called upon to remedy.

In adults the attack is less menacing as a rule. The presence of the membrane only produces symptoms of laryngitis, and the diagnosis from other forms of laryngeal obstruction is more readily made, since a satisfactory examination with the mirror is easily obtained.

Dyspnoea in adults is less frequently observed, but when it does appear, the prognosis is apt to be worse than in children, as its presence in adults indicates a relatively more serious attack.

If membranous *pharyngitis* is associated with the croup, we can argue with fair certainty that the disease in the larynx is diphtheria; and when membranous casts of the larynx or trachea and bronchi are coughed up, the same diagnosis may be made clinically. But in all cases of membranous laryngitis, as in membranous pharyngitis, the aid of the bacteriologist should be sought to enable us to base our diagnosis upon a sure foundation. (See also “Diphtheria,” p. 37.)

Prognosis.—If the disease proves to be diphtheria the prognosis will be that of that disease.

We may say, however, that laryngeal diphtheria, whether primary or secondary, whether in children or in adults, always renders prognosis grave.

Treatment.—*Locally*, the treatment is the same as for acute laryngitis with oedema. Tracheotomy or intubation may be called for early in the case.

Generally, the treatment will be dictated by the nature of the infection.

Laryngitis from Mustard Gas (A. Ryland, ‘Journ. of Laryng., etc.,’ vol. xxxiv, p. 153).—After exposure to this gas, while the larynx as a whole becomes generally, though not severely congested, it is the vocal cords that suffer most.

Along the middle third of the cords a yellow, fibrinous membrane or slough forms, overlapping their free edges and causing hoarseness by preventing their approximation. The membrane is tough and adherent. In

the course of several days it becomes notched or nibbled along its margins and undergoes gradual disappearance, leaving the cords pink and a little œdematous.

The larynx is painful and there is dysphagia. Similar patches of membrane may also be present on the posterior pharyngeal wall, on the epiglottis and arytenoids (A. Brown Kelly).

The subsequent progress resembles that of simple acute laryngitis, although recovery is slower, the hoarseness or aphonia, due in this trouble to myopathic paresis, being particularly obstinate.

Treatment consists in spraying the interior of the larynx with menthol in liquid paraffin (gr. v to the ounce) from time to time.

(A. Brown Kelly, under the title of "Chorditis Fibrinosa," describes a form of laryngitis similar to the above, but not caused by mustard gas, and J. A. M. Hemmeon has made a similar observation, growing a streptococcus from the larynx.)

CHRONIC LARYNGITIS

Under this heading a large number of diseases must be gathered, some of which have nothing in common with each other save that they induce chronic inflammation in the larynx. Resembling each other closely in their laryngeal manifestations, they supply us with the diagnostic puzzles of laryngeal practice.

Even if we exclude tuberculosis, lupus, syphilis and cancer, any of which may induce appearances simulating simple chronic laryngitis, the varieties of the disease are very numerous, ranging as they do from the chronic hyperæmia of overworked singers to the pachydermia of alcoholism and Bright's disease.

Ætiology.—Chronic laryngitis can be induced by abuse of the voice—a variety of the disease at once common and difficult to cure. Otherwise it is practically always secondary to some other abnormality or disease.

It may follow a series of acute or subacute attacks of catarrhal laryngitis. It is frequently set up by irritating dust, such as the chalk dust of the school black-board, or by irritating gases or vapours as in warfare. It is common in alcoholics, and is liable to come on as a result of excessive smoking, especially if the habit of inhaling is practised.

Again, nasal disease, such as sinus suppuration, atrophic rhinitis and the like, sometimes lead to chronic laryngitis, and the same is true in adult life of nasal obstruction from deviations of the septum and turbinal hypertrophies.

The pachydermatous or hyperplastic type is often part and parcel of a constitutional tendency to fibrosis, which may also be expressed in albuminuria and other phenomena of chronic Bright's disease (Jobson Horne).

Finally, although we can only deal with them in their proper place, it must not be forgotten here that tuberculosis, lupus, syphilis and cancer

all induce by their presence more or less chronic laryngitis, and consequently in their earlier stages they may give rise to appearances in which no indication of any grave underlying disease is manifest.

Pathology.—The changes start with hyperæmia and lymphocytic infiltration of the mucous and submucous layers of the larynx and pass on to a general fibrotic hypertrophy of the soft tissues. The mucous membrane is hyperæmic, thickened and thrown into folds; the vocal cords become red and thick; and the formation of outgrowths in the shape of fibromata and other tumour-like projections in or about the cords and inter-arytenoid region is common.

Symptoms of Chronic Laryngitis.—More or less huskiness of voice exists, especially after prolonged use, as in public speaking or singing. Or the voice gets quickly tired and is lost altogether after a little use. There is frequently dry cough, with, at times, a continual tickling in the pharynx or larynx. Another common symptom of the early stages, and one very annoying to public singers and speakers, is the accumulation of mucus in the larynx and the frequent necessity felt to “clear the voice,” sometimes in the middle of a sustained note, or at other inconvenient moments. (This symptom is often complained of before any change in the tone of the voice is observed. Not infrequently it is due to chronic nasal catarrh. Sometimes no cause can be found for it, and no sign of any disease either in the larynx or in the nose can be observed.)

In general, unless the patient is a singer or public speaker, the earlier symptoms of chronic laryngitis are overlooked or ignored, and by the time the patient comes to consult us the second stage of the disease has been reached, in which definite hoarseness is present. The voice is now rough and breathy, or husky, and shows a tendency to complete aphonia after it has been resting, as in the morning. The easy flexibility and power of varying the pitch and strength of the voice is diminished even for ordinary conversation, and singing can no longer be practised. Coughing is usual, especially after getting up in the morning, and the noisy, hawking efforts of the patient struggling to get rid of an imaginary accumulation of “phlegm” aggravate the already existing laryngeal irritation.

The third stage consists of more or less permanent aphonia. Many patients never get as far as this third stage; others, again, arrive rapidly at the state of aphonia by reason of the development of a tumour on one or other cord interfering with their closure.

On *examination* the appearances vary with the stage and severity of the disease.

At first little or nothing may be found to correspond with the patient's complaints. Or the pink colour of the cords may be deeper and they may appear a little fuller than usual.

These appearances are more pronounced immediately after the voice has been used, but they tend to become permanent, until finally the cords become uniformly red and infiltrated, with thickened, rounded edges,

presenting on attempted phonation more or less imperfect approximation, there being a fine elliptical opening between them as they vibrate.

In the third stage the cords are thick, deep red, and fleshy, and no longer seem to differ either in colour or in texture from the rest of the interior of the congested larynx. Their movements are sluggish, their approximation imperfect, and their surface is dry. At this period a certain amount of thickening and protuberance of the interarytenoid mucosa is common, and this, being thrown into prominent folds during attempted phonation, still further impedes the proper closure of the cords, particularly towards their posterior ends. Or the hyperplastic change may affect by preference the ventricular bands, so that they become so bulky and prominent as to conceal the true cords. When hypertrophies like these are present the term *hypertrophic or hyperplastic laryngitis* is appropriate.

Along with these changes there is often increase in the quantity of mucus secreted, and it tends to become thick and sticky and may be seen adhering to the cords.

Occasionally shallow breaches of the surface of the mucous membrane may be noticed, especially towards the posterior end of the cords.

The following sub-varieties of chronic laryngitis are distinguished :

Pachydermia Laryngis. This name, introduced by Virchow, has become a mere term of convenience ; it is now generally applied to the hypertrophic form of the disease, and more particularly to those cases, by no means uncommon, where the vocal cords, especially towards their posterior ends, manifest thickening, redness and irregular but symmetrical blunt elevations or prominences. The condition may be discovered by accident, as symptoms may be entirely absent, but as a rule more or less interference with phonation is present, and sometimes, indeed, the voice is very rough and hoarse.

On examination red and flesh-like prominences on the vocal processes are visible, and the typical clinical picture presents itself when the prominence in the one cord corresponds to a depression in the other, into which it fits during phonation.

The appearance is very liable to be mistaken, sometimes even by experienced eyes, for malignant disease. The great distinguishing feature is that pachydermia is symmetrical, whereas epithelioma is unilateral.

In like manner it may be mistaken for syphilis or tuberculosis. On the other hand, either of those two diseases may produce pachydermia.

Nodular Laryngitis. (*Chorditis tuberosa* (Singer's Nodes). In this form of chronic laryngitis, which is due to faulty voice-production, to overstrain or other abuse of the voice, two small nodules, consisting of thickened epithelium, appear, situated usually on the edge of the cords at the junction of the anterior and middle third, and opposite to each other. If large enough to interfere with the effective closure of the cords they induce persistent hoarseness, but when small they may only affect certain notes, or impair the delicacy of the voice in *piano* passages. (Fig. 45.) An

analogous change is responsible for the aphonia sometimes observed in crying children (Screamers' Nodes).

If the nodules are sufficiently prominent they may be removed by suitable forceps, either by the direct or by the indirect method. Otherwise they will disappear if absolute silence can be maintained for a prolonged period. After their disappearance measures must be adopted to prevent their recurrence in the avoidance of the faults in voice production that induced them. We must add that although singers' nodes may be found in a larynx otherwise healthy and free from inflammatory changes, they are, nevertheless, frequently accompanied by more or less laryngitis. In any case their removal may fail to cure the vocal symptoms.

Laryngitis Sicca.—Apart from the chronic dry laryngitis that accompanies ozæna (see p. 293), we occasionally meet with a variety in which the mucosa of the larynx is reddened, a little glazed and thickened without much tendency to hypertrophy. The characteristic feature of this type, however, is the formation of adhesive flakes of tough mucus upon the cords, giving rise to a periodical hoarseness, alternating, each time the patient contrives to detach the mucus, with almost or quite clear phonation.

For this variety inject freely into the larynx, by means of a laryngeal syringe, a saturated watery solution of sod. bicarb., warmed. This at once loosens the sticky mucus, which the patient proceeds to cough up, and so he clears his voice. He can be taught to syringe the larynx for himself. Otherwise, treat like the other types of chronic laryngitis.

Diagnosis of Chronic Laryngitis.—The presence of the signs of chronic laryngitis should lead to an extended examination of the patient in order to exclude nasal disease, syphilis of the larynx, Bright's disease, alcoholism and tuberculosis of the lungs or larynx before we conclude that the case is one of simple or primary chronic laryngitis.

From malignant disease it is distinguished, as we have already observed, by its local symmetry, and also by its persistence with little or no alteration in the signs for prolonged periods of time. It must not be forgotten, however, that cancer may develop in a larynx which is already the seat of chronic inflammatory changes. (See p. 149.)

Prognosis.—Simple chronic laryngitis will get well spontaneously if the cause can be removed and the voice rested.

The most obstinate cases are those showing cirrhotic hypertrophy and pachydermia, especially if the patient be a man of middle age addicted to tobacco, alcohol, and coarse laughter, with a high blood-pressure and a low moral code.

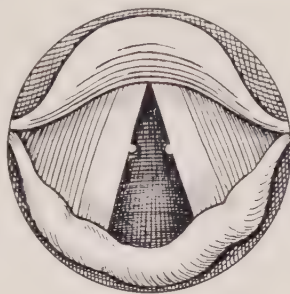


FIG. 45.—The situation of Singers' Nodes (diagrammatic).

The laryngeal changes which would render a soprano or a tenor hoarse or even voiceless, may have little or no influence upon a contralto or a bass, save, perhaps, to deepen the voice. Cases have been recorded (C. Horsford) in which cure of chronic laryngitis has transformed a voice from bass to tenor.

Treatment.—The most probable cause should be sought for and removed. Nasal obstruction or suppuration should be treated and bad habits reformed.

Locally the voice should obtain absolute rest for several weeks or months, no public speaking and no singing being permitted. This is often a counsel of perfection, and people who live by their voice will not carry it out.

In obstinate cases, laryngeal aqueous sprays containing some alkali, such as—

P. Sod. Bicarb.	.	.	.	.	.	.	.	gr. v
P. Sod. Bibor.	.	.	.	.	.	.	.	gr. v
P. Sod. Chlor.	.	.	.	.	.	.	.	gr. v
P. Sacch. Alb.	.	.	.	.	.	.	.	gr. x
								M.

in four ounces of warm water ; or oily sprays containing menthol (gr. iij to ʒj) ; ol. eucalypt. (mij to ʒj) may be employed.

Applications at intervals by means of a laryngeal swab are often useful, such as zinc. chlor. in aq. (gr. x to ʒj) ; or—

R	Liq. Ferr. Perchlor.	.	.	.	.	.	.	mʒj
	Menthol .	.	.	.	.	.	.	gr. iij
	Glycerin .	.	.	.	.	.	.	ad ʒj
								M.

Internally, tonics containing nux vomica or strychnine are useful. But for the cure of the hypertrophic or pachydermatous varieties, potass. iodid. gr. vi to x, *t.i.d.*, for prolonged periods has a well-deserved reputation, even when the disease is non-syphilitic in origin. In this variety protuberances that prevent the apposition of the cords may be removed with forceps, but it is to be remembered that in a few months they will form again unless steps are taken to get rid of the disease otherwise.

Singers, clergymen and other voice-users are frequently the subjects of a *hyperæsthesia laryngis*, and then moral treatment is as valuable as local applications to the larynx, but the latter may be employed as an aid to the former. In any case the local agent should be mild.

Young persons who are training to become singers frequently come asking for relief from the early symptoms of chronic laryngitis. The throat-surgeon, consulted by these patients, must use his own judgment. Some require an operation on nose or throat. Some require a change of singing-master or method. Some are not fitted to become vocalists.

Modern methods of teaching and voice-training, in response to the demands of the concert-hall, too frequently endeavour to force from the average voice a compass and a sustained strength quite beyond its powers.

Gouty Laryngitis.—The rough or “port-wine” voice of gouty people is due to a general laryngeal congestion with some tendency to œdema of the arytenoid eminences, especially distinct in the morning hours.

The reddish or livid colour of the mucosa serves to distinguish the œdema of gout from that of tuberculosis.

Laryngeal phenomena are frequently associated with gouty pharyngitis. (See p. 49.)

A **Chronic Subglottic Laryngitis** is described in which the inflammatory process affects, chiefly or exclusively, the larynx below the cords. It is a great rarity.

The *symptoms* resemble those of the ordinary chronic laryngitis, but the change in the voice is less pronounced. The swelling, moreover, may be so great as to cause dyspnœa and to necessitate intubation or tracheotomy.

Laryngoscopy reveals lateral symmetrical swellings projecting from below the cords. They are smooth and reddish in colour, and may approach each other so closely as to narrow the airway.

Their symmetry distinguishes chronic subglottic laryngitis from epithelioma and tuberculosis—the commonest causes of subglottic swelling. Enchondroma, besides being unilateral, is pale in colour and has a hard surface.

The same *treatment* is adopted as for the commoner chronic laryngitis, with the addition of tracheotomy or intubation when necessary.

CHONDRITIS AND PERICHONDRITIS OF THE LARYNX

Chondritis and Perichondritis are almost invariably secondary to tubercle, syphilis, malignant disease, typhoid fever, smallpox, diphtheria or to sepsis, as from wounds or the presence of a foreign body in the larynx. Any one or more than one of the cartilages may be affected, but the arytenoid is perhaps most frequently attacked, in which case the corresponding cord is fixed. As a result of the inflammation a larger or smaller portion of the cartilage dies, and an abscess forms, which may be seen projecting into the larynx, or may be felt in the neck as a tender swelling over one or other cartilage. After the abscess has broken, and the pus is discharged, the sequestrum may be got rid of later. Many cases, however, stop short of necrosis, but in all cases the resulting cicatrization is liable to produce permanent hoarseness or dyspnœa from distortion of the parts, fixation of the cords, etc. It may thus be possible to recognize, on examining the larynx, the traces of a long-past perichondritis.

The *symptoms* vary with the acuteness of the attack and the character of the primary disease. There is always more or less severe pain, generally with fever and constitutional disturbance. And if an abscess forms the swelling and infiltration interfere both with phonation and with respiration. The dyspnœa may be so severe as to necessitate tracheotomy.

In later stages the laryngeal lumen may be encroached upon by such

consequences of the perichondritis as fixation of the cords in the middle line, the impaction or displacement of sequestered pieces of cartilage, cicatricial contraction and adhesions and so on.

Prognosis.—The prognosis of laryngeal perichondritis is always serious, but varies in gravity with the cause. If the primary disease is cancer or tuberculosis, the onset of perichondritis frequently introduces the terminal stage of the disease.

Diagnosis.—The diagnosis of the disease itself presents little difficulty, the pain, often with external tenderness, and the irregular internal swelling with the constitutional effects of a septic process being sufficient to establish the presence of perichondritis. But it is very difficult, and indeed, during the acute stages it may be impossible, to determine what the cause of the perichondritis has been, and this is particularly liable to happen when the causative disease has been latent until the onset of the inflammatory lesion, so that our view of the interior of the larynx is so obscured by œdema and swelling that it is impossible to see whether or not any surface ulceration is present.

Correct diagnosis in the case of tuberculous perichondritis is, however, often rendered possible by the pallid œdema of the interior of the larynx, as well as by the presence of signs of tuberculosis elsewhere.

In doubtful cases an X-ray examination may give valuable help. The larynx, as well as the thorax, should be skiagraphed, as the perichondritis may be due to a foreign body.

Treatment.—The patient is kept in bed and hot fomentations are applied to the neck. Internally ice is given to suck, and opium is useful for the relief of the pain and distress. (Edema may be countered by a laryngeal spray of cocaine (2 per cent.) and adrenalin (1-1000). If an abscess forms and points, it should be opened as early as possible, either externally or internally, according to its situation. The occurrence of dyspnœa should lead to prompt tracheotomy.

These measures having been taken, we proceed to search for the cause and direct our treatment to its removal or cure.

Prolapse of the Ventricle of the Larynx.—The ventricle is a horizontal, elliptical space, situated between the vocal cord and the ventricular band, from the anterior end of the roof of which rises a vertical pouch, the sacculus.

Much discussion has raged round the possibility of prolapse of the mucous membrane lining these spaces, and it cannot be denied that in most cases what appears to be prolapse is merely inflammatory œdema or hyperplasia, frequently tubercular. Nevertheless a few undoubted specimens of true prolapse are to be seen in the museums. (Irwin Moore, 'Journ. of Laryng.', vol. xxxvii, p. 265.)

Inflammation of the Crico-Arytenoid Articulation.—Synovitis of the crico-arytenoid articulation is not uncommon in acute rheumatism, in

which disease it may be the first, and, indeed, it is said, the only joint attacked. Gout also is said to affect this articulation at times.

Symptoms.—There is pain deep in the neck, usually on one side only, aggravated by swallowing and sometimes on phonating. The voice may be weak. In the course of a few days the synovitis subsides and the symptoms are relieved, but there is a possibility of ankylosis of the joint supervening, in which case the voice may be seriously and permanently impaired.

Ankylosis of the Crico-Arytenoid Articulation. —*Etiology.*—Any deposit, gouty or rheumatic, in or around the joint may lead to its fixation, as may cicatrices from wounds, such as cut-throat or from traumata. It may be set up by acute perichondritis from whatever cause arising, and it may be a sequel to the acute inflammatory lesions of septic pharyngitis, diphtheria, scarlet or typhoid fever.

Symptoms.—The fixation of the arytenoid cartilage produced by ankylosis immobilizes the corresponding vocal cord, and thus simulates fixation of the cord from paralysis.

Ankylosis may fix the cord in any position, and upon the position assumed depends the nature of the interference with phonation. The ankylosis may be bilateral, in which case both arytenoid cartilages, and, of course, both vocal cords will be immobilized.

When one cord only is affected, and it is fixed in the middle line, no interference with phonation will be experienced. These cases are, as a rule, accidentally discovered on making a routine examination of the larynx.

In many cases, however, there is considerable dysphonia or actual aphonia, and the patient comes complaining of this disability. Then examination reveals one or other, or, in bilateral cases, both cords fixed in the cadaveric position, more rarely in the position of abduction.

If both cords are affected, and in any position save the median, absolute aphonia will be present. If they are both fixed in the middle line they obstruct respiration, and may induce fatal asphyxia, although phonation is unaffected. In this position paralysis of abduction affecting both cords is simulated.

Diagnosis.—Fixation of one or both cords from ankylosis has to be differentiated from fixation of the cord in consequence of paralysis.

In ankylosis there may be some swelling around the affected joint, as may be easily seen by practising hypopharyngoscopy. (See p. 105.) But the simplest method of ascertaining whether or not the arytenoid cartilage is movable is to pass the direct laryngeal tube-spatula, and to endeavour to move the affected arytenoid by means of a stout long probe. If there is ankylosis the arytenoid will be immovable. If the cause is paralysis without ankylosis the arytenoid will move with the probe (William Hill).

Treatment.—If there is any interference with the respiration from malposition of the cords, a low tracheotomy should at once be performed, and the patient should wear a tracheal cannula for the rest of his life. It may be possible, and it is sometimes advisable, to reconstitute the laryngeal lumen by removing both of the vocal cords by operation, performed with

the aid of suspension laryngoscopy. But this measure is not always successful, and if successful it permanently destroys the voice, so that the patient will probably prefer to keep his voice even at the cost of wearing a tracheotomy tube.

SYPHILIS OF THE LARYNX

Syphilis does not attack the larynx so frequently as it does the pharynx, but it is not a rare laryngeal disease by any means, and the laryngologist should be able to diagnose laryngeal syphilis promptly as well as to treat it efficiently.

Hereditary Syphilis may be found affecting the larynx in the form of (1) laryngeal catarrh—the rough, harsh voice of the syphilitic infant—or in (2) tertiary deposits, usually appearing about puberty.

Acquired Syphilis may induce laryngeal disturbances at any period of the disease, these disturbances varying in severity from simple catarrh to deep ulceration with perichondritis, which, if not quickly controlled, may cause death.

(1) **Syphilitic Catarrh of the Larynx** is an early secondary manifestation. It takes the form of persistent erythema, but unless the cords are attacked, it may cause no symptoms and attract no notice.

(2) **Mucous Patches** are rare in the larynx, but they are occasionally seen as areas of greyish thickening on the cords or on the lingual surface of the epiglottis. They may pass into slight superficial ulcers, but the tendency to deep ulceration, so common in the pharyngeal mucous patch, does not seem to occur in the larynx.

(3) **The Gumma and Gummatus Infiltration** is the most frequent form of laryngeal syphilis. Before they ulcerate gummata appear as smooth, rounded, reddish-yellow swellings, which may form anywhere in the larynx, and sometimes produce a more or less general infiltration. As isolated deposits they prefer the epiglottis, the ary-epiglottic folds, the posterior wall and the ventricular bands. The ulcer resulting from the breaking down of a gumma is deep and punched out, with abrupt edges and a red areola. And the base is occupied by a fawn-coloured or “wash-leather” slough, which is very characteristic. The ulceration is often accompanied with perichondritis, in which case pain, external swelling and tenderness, together with constitutional disturbance, bring the case within danger-limits. Necrosis of the affected cartilage with exfoliation occurs in grave and neglected cases, but when promptly treated the perichondrial inflammation tends to resolve quickly. Its healing is productive of considerable cicatricial deformity.

(4) Another typical syphilitic manifestation in the larynx is the **diffuse infiltration**, in the course of which the submucous tissue of the whole interior becomes the seat of small-celled infiltration, which induces a general pachydermatous or hyperplastic appearance with fleshy protuberances in the interarytenoid region, the cords participating in the general hyperplasia.

(5) All tertiary changes in the larynx, when they undergo recovery, eventuate in **cicatricial contractions**, whereby great deformities, irregularities and functional disturbances may be produced. The diffuse infiltration we have just mentioned, for example, when it undergoes healing transforms the whole of the interior of the larynx into cicatricial tissue, and may induce a *fibroid contraction* of the organ. The chink of the glottis may become more or less obstructed by webs of connective tissue stretching from wall to wall: ankylosis of the crico-arytenoid articulation may produce irremediable hoarseness; while the ventricular bands, the vocal cords and the epiglottis may be altered out of all recognition.

The *symptoms*, of course, depend upon the character and site of the lesion, but hoarseness is the most usual complaint, while cough, and, in the obstructing lesions, dyspnoea may be prominent. Pain is seldom experienced unless perichondritis has been set up.

The *diagnosis* of the nature of the lesion is sometimes difficult.

Diffuse syphilitic infiltration of the larynx may resemble simple hyperplastic laryngitis so closely that it is impossible to make any decision from inspection alone, and we have to depend upon information derived from the history and general examination of the patient, and upon the Wassermann reaction. Even the therapeutic test is for once unreliable, as iodide of potassium may lead to cure of the non-syphilitic hyperplastic disease.

Gummatous infiltration and ulceration, especially when unilateral, and in the false and true cords, often very closely simulates epithelioma. In syphilis, however, the rate of tissue invasion and destruction is more rapid than in epithelioma. In other words the history of the case will show us that the symptoms are of recent origin in spite of the relatively wide extent of the disease.

A history of syphilitic infection or a positive Wassermann reaction, while they inform us that the patient has had syphilis, do not, it must be remembered, certify that this or any particular lesion is syphilitic. Cancer may appear in a syphilitic patient. In some cases, therefore, uncertainty may be unavoidable until the therapeutic test of anti-syphilitic remedies has been applied. And even here caution must be exercised, as the exhibition of potass. iodid. in cancer is commonly followed, for a few weeks at least, by a reduction in the swelling and infiltration of the growth.

On the other hand, as we have already observed, a negative Wassermann reaction may be reported when the lesion is syphilitic. (See p. 86.)

Some authorities decry the removal of a small portion of the suspected tissue for microscopic examination, but where time is of value, the writer believes it wiser, in a doubtful case, to remove a piece from the diseased area in the larynx for diagnostic purposes than to risk a decision upon naked-eye appearances alone.

From tuberculosis of the larynx, syphilis, as a rule, is easy to distinguish,

and attention to the description of the two diseases given in the text ought to be sufficient to prevent errors being made. (See p. 127.) In brief, the infiltration produced by tuberculosis is pallid, and its ulceration, when present, is more superficial, while the granulations are pale and languid. There are usually also indications of tuberculosis in the lungs or elsewhere, while the action of anti-luetic remedies in a tuberculosis case is productive of harm.

Real difficulty indeed seldom arises save in a mixed case—where, that is to say, the larynx is the seat of combined syphilis and tuberculosis—and this possibility should always lead to an examination of the lungs in a doubtful case.

The *prognosis* of syphilis of the larynx under treatment is good as regards life, except in advanced cases, where perichondritis has had time to develop. But the recovery of a clear voice can scarcely be expected if the cords have been attacked by the disease. At the same time, the amount of recovery of voice obtained by suitable treatment is often surprisingly great.

Where the larynx has undergone extensive and obstructive cicatrization, a tracheotomy tube may have to be constantly worn.

Treatment.—Before the introduction of the salvarsan group of remedies it was often found advisable to perform tracheotomy before beginning treatment with potass. iodid., as this drug frequently induces glottic œdema, and so may imperil the patient's life. But nowadays, even where there is already a certain amount of stridor present, tracheotomy may be dispensed with if salvarsan be given, as the improvement that drug effects upon the larynx is so immediate and considerable that stridor is rapidly lost.

Tracheotomy, however, may nevertheless still be necessary when the obstruction is of such a character as to resist the anti-syphilitic remedies, as when a perichondritic swelling or a cicatricial contraction or webbing has blocked up the lumen of the larynx.

Such adhesions and webs, however, may be divided intra-laryngeally with benefit, although the result, it should be added, is not always up to expectation. They are very prone to re-form.

Locally, attention is applied to the cleansing of septic ulcers with sprays, as of hydrogen peroxide (10 vols. per cent.). If there is pain on swallowing, it may be relieved by insufflations or inhalations through Leduc's tube of orthoform or anæsthesin. Exuberant granulations may be curetted, but under vigorous general treatment they disappear spontaneously.

For *general treatment of syphilis*, see p. 83.

It is a wise plan if there is stridulous breathing to confine the patient to bed until the dangerous period has been tided over, and instruments should be at hand for the immediate performance of tracheotomy if the necessity for urgent interference should arise. But it is less likely to do so than in the more severe types of inflammatory, diphtheritic, tuberculous or cancerous obstruction—at all events once salvarsan has been administered.

TUBERCULOSIS OF THE LARYNX

(Tuberculous Laryngitis ; Laryngeal Phthisis)

(See also 'Tuberculosis of the Larynx,' by Sir StClair Thomson, Privy Council Medical Research Council, Special Report Series, No. 83, 1924.)

Tuberculosis is the commonest specific disease of the larynx, and is one of the most important laryngeal diseases by reason of the facts that (a) its discovery may render certain the diagnosis in a case of suspected pulmonary tuberculosis ; (b) its influence upon the prognosis of phthisis pulmonalis is very powerful, as it doubles the risks of that disease ; and (c) the treatment must be directed to the laryngeal as well as to the pulmonary lesion, although it is no doubt true that the disease in the larynx frequently gets better or worse in harmony with the condition of the lungs and of the general status of the patient.

Pathology.—The disease is practically always secondary to pulmonary tuberculosis, and if it appears in any case in which pulmonary deposits cannot be found clinically, their presence may, nevertheless, be assumed from the fact of the laryngeal disease.

For that reason it has been considered probable that the laryngeal disease is induced by sputum infection, and the local incidence of the tuberculous deposits supports this view, seeing that they affect, in the first instance at all events, the posterior regions, and those parts, such as the arytenoid and interarytenoid regions, where sputum is liable to cling and collect.

Some pathologists, however, favour the opinion that the infection is borne to the larynx in the blood and lymph-vessels from the lungs, because it is a submucous lesion to start with, and because it often develops in cases of pulmonary tuberculosis in which there is no expectoration.

The pathological process does not differ from that of tuberculosis elsewhere. There is the stage of tubercle formation in and around bacillar groups, followed by caseation-necrosis with breaking down, and in the superficial parts with the formation of ulcers. The posterior region of the larynx, as we have already remarked, is the locality most frequently attacked. Thus, of the lesions marking the site of invasion in early cases observed by Sir StClair Thomson, 480 were found in the posterior region, including the interarytenoid area, the vocal processes, and the arytenoids, while only 59 were found in the anterior region, including the epiglottis. The vocal cords were more frequently affected than any other single area, and together with the vocal processes afforded 366 lesions. Ulceration is most common on the cords and least common on the arytenoids (Sir StClair Thomson).

Healing, when it takes place, is brought about by lymphocytic infiltration and by fibrosis. Some cases from the outset manifest a strong

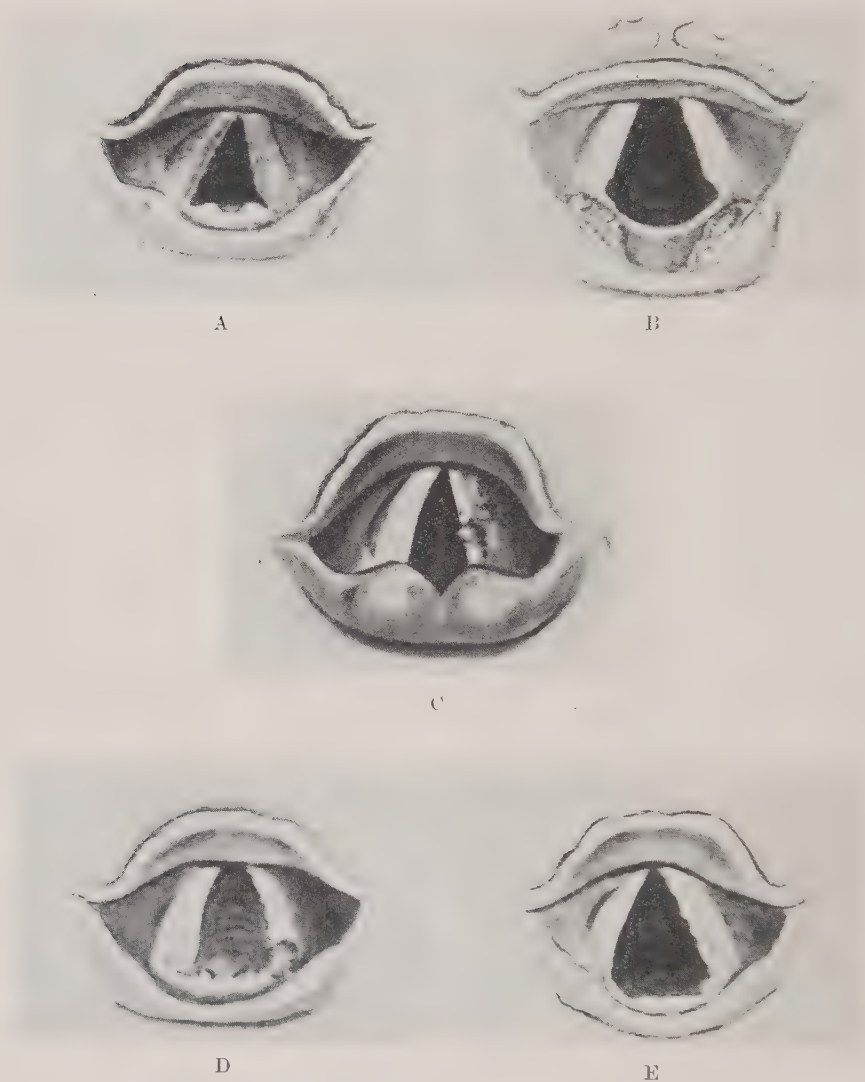


FIG. 46.—Early Tuberculosis of the Larynx.

A. Tuberculous interarytenoid deposit ulcerating in centre. Cords rounded, injected and abraded.

B. Typical, flat, ulcerating deposit above each vocal process.

C. Both arytenoids congested and enlarged. Deposit on left ventricular band.

D. Stalactite, ulcerating deposit in the arytenoid, and ulcerating deposit in both cords.

E. Same patient as Fig. D after six months' treatment. Right cord has healed; arytenoid disease has diminished; left cord is healing.

(From Sir StClair Thomson.)

tendency towards fibrosis and cure, while in others little or no success seems to attend the tissue-reaction against the bacillus.

For the sake of convenience, the progress of the disease may be described in stages or periods, but in many cases these stages blend and coincide. These are the stages (1) of infiltration, (2) of ulceration, (3) of perichondritis. Fibrosis may attend any one of the stages, but the most favourable cases do not progress beyond infiltration with a little superficial ulceration. The less favourable show deep ulceration with profuse granulations, and the least favourable a general grey infiltration of the whole interior of the larynx, rapidly breaking down without any evidence of fibrous tissue formation.

Incidence in Pulmonary Tuberculosis.—Of 2541 patients with phthisis pulmonalis examined by Sir StClair Thomson, 477 gave evidence of laryngeal tuberculosis. The percentage increases with the extension of the lung disease. Thus he found 4 per cent. of slight, 18 per cent. of severe, and 31 per cent. of advanced cases affected, while the post-mortem examination of fatal cases shows 50 per cent. with tuberculosis of the larynx as well as of the lungs (Percy Kidd). Sir StClair Thomson makes the interesting observation that the frequency of the laryngeal disease, relative to that of the lungs, seems to be diminishing. His figures, it may be added, give no support to the once prevalent idea that tuberculosis of one lung tends to infect the homolateral side of the larynx.

Symptoms.—Tuberculosis of the larynx may set in without producing any symptoms referable to the larynx. Cough is often absent, and when it is present, it is pulmonary rather than laryngeal in origin. The voice may manifest no change at all at this early date. The fact of this latency, therefore, renders an examination of the larynx an *important routine procedure* in all cases of pulmonary tuberculosis or suspected pulmonary tuberculosis.

The commonest overt indication of laryngeal invasion is given in the voice. Hoarseness, at first perhaps slight, gradually becomes progressively worse, the voice taking on a peculiar weak huskiness, which may not be much more in the later stages than a rough whisper—a characteristic sound when combined, as it often is, with a rattling, incomplete cough.

When the stage of ulceration is reached, especially when the ulcerated surfaces lie where they are moved or irritated in the act of deglutition, then the patient may become the victim of the ominous and distressing odynphagia—pain on swallowing—which, by its interference with the taking of food, renders his downward progress precipitate. This suffering is often intensified by dysphagia from swelling of the epiglottis or arytenoids, by reason of which fluids enter the larynx during attempts at deglutition and excite distressing spasm and choking.

The appearances in the larynx *on examination* show great variety.

In the earliest stages nothing may be visible but the signs of catarrhal laryngitis—congestion of the mucosa, the cords particularly manifesting abnormal redness. This redness and congestion is frequently of a patchy and irregular distribution, and if the background, as it were, of mucous

membrane is pale and anæmic, if, besides, the pharyngeal wall shows an unusual pallor, while the lips and other mucous surfaces show normal redness, then the case should be regarded with grave suspicion, even although no evidence of any infiltration can be discovered. At this stage, a myasthenic weakness or absence of the voice simulating hysterical aphonia is not unusual.

In the stage of deposition or infiltration, the posterior regions, as we have seen, are usually the first to be selected by the disease. In the interarytenoid area the earliest appearance takes the form of a rounded elevation, like the protuberance so often seen here in hypertrophic laryngitis. Ulceration starts at the apex of the nodule, or in the clefts between the folds that form in it when the cords come together. Diagnosis is often uncertain until ulceration occurs, but if the patient is known to have pulmonary changes, tuberculosis may be presumed. (Fig. 46.)

Another common site for early deposit is the posterior wall just above the vocal process of one or other or both sides.

The vocal cords, as we have seen, are frequently involved, the favourite locality being the posterior two-thirds. In its early stages, before ulceration, the cord shows catarrhal redness and want of tension, while its upper surface becomes rounded, often irregularly. Ulceration soon takes place, as the mucosa is very thin, the ulcers being small and shallow, pink, grey or yellow in colour, and often "mouse-nibbled" along their borders.

Starting in this insidious fashion the disease, if untreated, tends to spread. From the vocal processes or the interarytenoid region it passes to the arytenoids and thence to the ary-epiglottic folds; from the vocal cords to the ventricular bands; and so on, until we are faced with tuberculous infiltration and ulceration over a wide area. The arytenoids, one or both, become swollen, rounded or pear-shaped and semi-translucent, not, it is said, from true œdema, although the swelling looks like œdema, but from tuberculous infiltration and inflammation. It differs from simple inflammatory œdema in producing less bulky swelling, while it is, of course, much more chronic.

The infiltration of the vocal cords changes their flat, even contour into a full and "soda-water-bottle shape." At first the ulcers are small and discrete, but they tend to coalesce. Here also sprouting granulations spring up, and with the surrounding infiltration, lead to an entire alteration in the appearance of the glottic isthmus and walls.

The ventricular bands, when affected with tubercle, undergo tumefaction and conceal the vocal cords. The epiglottis becomes thick and swollen, and when puffed up with pseudo-œdema assumes the classical "turban" or sausage shape. The destructive action of ulceration is also early seen in the epiglottis, and may lead to its destruction, only a slight stump remaining. Ulcers on the epiglottis, and on the pharyngeal side of the arytenoids, being exposed to the friction of food passing over them, are a common source of the agonizing odynphagia of the later stages of laryngeal tuberculosis.

In the subglottic region the infiltration and granulations sprouting into the free lumen lead to narrowing of the airway, and appear on inspection as swellings below the vocal cords.

Perichondritis may set in relatively early in the course of the disease, but it is most frequent in the old cases. This complication is probably due to a secondary septic infection of the tubercle-riddled tissues, and it causes a massive necrosis of the cartilage attacked—most commonly the arytenoid. Abscess forms and breaks with a thin purulent discharge, which proceeds through one or more sinuses or openings usually into the interior of the larynx, although when the thyroid cartilage is the seat of perichondritis, the abscess may form on its outer aspect and necessitate opening from the neck.

The symptoms of perichondritis and its effects have already been described (see p. 121), and those due to tuberculous perichondritis resemble the others in the general features. The occurrence of perichondritis in tuberculosis gravely compromises the patient's chances.

The foregoing account gives a sketch of the more frequent types of laryngeal tuberculosis, but there is no laryngeal disease which presents so many varieties. Among others, the following may be mentioned :

First, tuberculosis may remain more or less localized to one area—the epiglottis or the interarytenoid region for example—manifesting an indolence and a tendency to fibrosis that may, as a matter of fact, slowly end in recovery. More often, however, the disease becomes generalized and proves to be incurable.

Another rare variety is that where the *tuberculoma* forms. This is a well-defined, smooth, pale, rounded tumour, which, it is sometimes said, rarely ulcerates, and is not associated with tuberculosis elsewhere in the larynx. Most authorities agree, however, that this form of the disease generally assumes, sooner or later, the aspect of typical laryngeal tuberculosis.

Finally, mention must be made of a variety which, although by no means rare, does not always receive the emphasis worthy of its gloomy significance. To this type we have already alluded in an earlier section under the description of *general grey infiltration*. The whole of the larynx seems to be uniformly and equally involved, and the mucous surface shows a finely granular appearance, the arytenoids, ary-epiglottic folds and epiglottis being equally affected, and in the grey pallor such ulceration as is present is difficult to see and to define. So little, indeed, does the colour of the ulcerated surface differ from that of the still intact mucous membrane that it is only by the obvious erosion and crumbled appearance of the outlines that we are aware that ulceration has taken place. This is particularly true of the ventricular bands and the vocal cords, the movements of which are stiff and imperfect from the infiltration and enfeeblement of their muscles. The only effect of their efforts is a toneless whisper and an imperfect cough, which fails to eject from the laryngeal surface the stringy and trailing muco-purulent secretion that is hanging upon it.

General grey infiltration is the terminal stage of many of the varieties we have been describing, but it may appear right at the very beginning of tuberculous disease of the larynx.

Tuberculosis of the larynx in *children* has been described by Agassiz ('Journ. of Laryng.,' vol. xxxviii, p. 628) from an experience of 11 cases. Marked symptoms are absent, but huskiness of the voice is common. In none was any dysphagia noted. Inspection showed swelling and redness of the arytenoids with or without ulceration of the cords.

Senile tuberculosis of the larynx may, as we have seen, resemble epithelioma closely. It is "seldom acute, but is very obstinate and is liable to be slowly progressive" (Sir StClair Thomson).

Diagnosis.—There is no disease of the larynx that is not at times simulated by tuberculosis.

What looks like simple catarrh may prove to be the first indication of the graver disease, and catarrhal laryngitis occurring in a phthisical patient should be regarded with misgiving unless it promptly and permanently disappears.

Functional aphonia, in like manner, is not infrequently a forerunner of tuberculosis.

In males over middle life a tuberculous deposit in and about the ventricular band and vocal cord of one side may, in its external appearance, and in its immobilizing of the cord, so closely resemble cancer as to deceive even the expert.

What look like the papilliform projections of simple pachydermia either on the cords or in the interarytenoid region may turn out to be tuberculosis, and even apparently simple neoplasms of the vocal cord, like fibromata or papillomata, may also prove to be the heralds of laryngeal phthisis.

Syphilis, likewise, may be simulated when the tuberculous disease takes on a general fibrotic tendency, but perhaps syphilis is less often mistaken for tuberculosis than the other diseases we have mentioned. Allusion to mixed syphilitic and tuberculous disease has already been made.

In all these mimicries, however, the false appearance is only temporary. Sooner or later the real nature of the disease declares itself unmistakably.

The points to notice are: The pallid colour of the infiltrated areas, and the tendency for the arytenoid eminences to become swollen and rounded.

Doubt need scarcely arise when the pulmonary disease is already known to be present, and so the clinical rule holds good that the lungs should be examined by means of X-rays as well as by the stethoscope in all laryngeal disease, and if there is any expectoration it should be searched for the tubercle bacillus.

Where it is important to make a prompt diagnosis in a doubtful case a portion of the diseased area should be removed and examined microscopically.

From lupus, a rare disease in the larynx (see p. 137), tuberculosis is distinguished by its irregular distribution, its production of pseudo-œdema, its tendency to avoid the epiglottis in the early stages, its moist surface,

its tendency to infiltrate deeply and to cause perichondritis, the painful character of its ulcers and its progressive course.

Prognosis.—Tuberculosis of the larynx is always serious, and as a complication of phthisis pulmonalis it frequently introduces the element into the situation that determines the issue. The danger consists in its resistance to treatment, and in its tendency to interfere with nutrition by inducing odynphagia.

Of the several varieties of the disease, those types which manifest infiltration, especially if only regional, without ulceration or with only slight ulceration, are the least unfavourable, while the worst type is the general grey infiltration.

If the lung disease is indolent or quiescent, if there is no fever and if the laryngeal lesion is not advanced, the prognosis, given efficient sanatorium treatment, is favourable; and this is particularly the case when the disease in the larynx is limited to the cords or the interarytenoid region. If, however, in spite of treatment, and a mild pulmonary disease, the laryngeal lesions continue to advance the outlook becomes serious.

Sir StClair Thomson regards with apprehension the combination of tuberculosis of the larynx with tubercle bacilli in the sputum and an absence of auscultatory signs in the lungs. Such cases die of miliary tuberculosis.

A relatively favourable variety is that rare form in which the disease is confined to the epiglottis, as it may then be possible to effect its eradication surgically.

The presence of ulceration, introducing as it does the factor of secondary infections, always renders the prognosis grave.

The chances in mixed syphilis and tuberculosis are very poor.

As in the case of the lungs, so with the larynx, the prognosis chiefly depends upon the response to treatment. It is often (but not invariably) found that lungs and larynx progress either favourably or unfavourably in harmony with each other.

Sir StClair Thomson points out that cases which come to throat clinics do badly because the disease is advanced before such patients recognize its presence. On the other hand, cases in sanatoria where the laryngeal disease is diagnosed early as a result of laryngeal examination have a much better chance of recovery.

Treatment.—General treatment is all-important, as the disease is one primarily of pulmonary tuberculosis. Thus, the first question to be decided is whether the case is one suitable for sanatorium treatment. The condition of the larynx must be considered in determining this question, but it may be said that if the state of the lungs and the general condition of the patient favour the adoption of the sanatorium treatment, fairly advanced laryngeal disease should not be considered as a contra-indication. The only laryngeal contra-indications of sanatorium treatment are intractable odynphagia preventing adequate nutrition and the general grey infiltration with ulceration. The reason for this is that remarkable improvement, even amounting

to cure of the laryngeal disease, may result from sanatorium treatment when the general condition of the patient responds favourably to it.

Locally, rest to the voice is of the first importance. This is ensured by insisting that the patient shall either preserve *absolute silence* for a prolonged period of time, or shall speak only in a *whisper*, the choice of those two alternatives depending upon the type of the lesion.

Silence is enjoined in all recent cases, even when they seem to be acute, as the stage of invasion is often marked by a catarrhal laryngitis, which may subside after treatment has been instituted. It is particularly valuable in early lesions of the cords, interarytenoid and arytenoid regions, and is even of service in painful lesions about the orifice of the larynx.

In carrying out the silence treatment, which is more easily accomplished in a sanatorium than at home, the patient communicates by writing only, making no effort whatever at speech. It may be continued for any period up to six months, but not longer. After this time, if the disease has improved, speaking in a whisper is substituted for the silence.

The silence treatment is a rigorous measure, and should not be insisted upon in hopeless cases.

Whispering, in addition to its use after the silence treatment, is also of benefit in long-standing chronic lesions. The whisper used is not the forced whisper, as that entails movement of the vocal cords, but only a whisper from the lips.

For the soothing of inflamed areas simple oily laryngeal sprays with menthol, chloretone and so on may be employed :

R	Menthol	gr. x
	Paraffin Liq. ad.	℥j
		M.
R	Chloretone	gr. v
	Menthol	gr. x
	Paraffin Liq. ad.	℥j
		M.

Caustics, astringents and irritants generally are to be condemned, but the constant wearing of an inhaler is decidedly useful, especially for the soothing of cough and laryngeal tickling and irritation.

For this may be used—

R Creosot.
Spt. Chlorof.
Spt. Vin. Rect. equal parts.

Sig. : A few drops on the sponge of the inhaler.

When it can be easily accomplished, the intra-tracheal injection of 10 per cent. menthol in olive oil, introduced by Walker Downie, of Glasgow, has proved useful in my hands, and I have even been able to teach patients to administer it to themselves.

Otherwise all laryngeal swabbings and applications should be strictly eschewed.

Curetting and other surgical measures, though warmly advocated at



FIG. 47.—Lake's Epiglottis Punch Forceps.

one time, should be confined to the removal of granulations and outgrowths, *when these are blocking the airway*. To this there is an exception, and that is in the case of tuberculosis limited to the epiglottis, in which case the epiglottis may be removed by Lake's epiglottis punch. (Fig. 47.) The loss

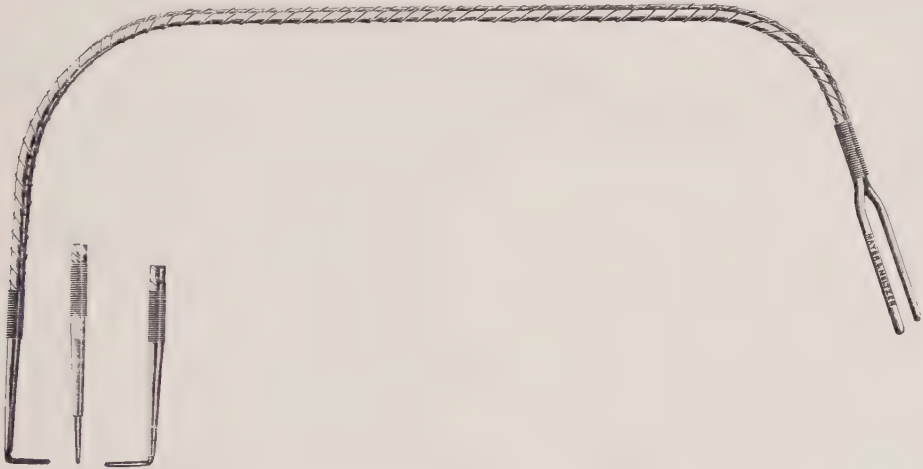


FIG. 48.—Author's Electrodes for Galvano-Puncture of Larynx.

of this appendage to the larynx has no effect upon the act of swallowing. Before undertaking the operation, however, the surgeon should assure himself that the rest of the larynx is really free of disease.

The other laryngeal manipulations, such as curetting, may be conveniently performed with suspension laryngoscopy. Care should be taken

not to carry the operation too deep, as the wounds are apt to bleed severely, and these patients are ill-adapted to withstand such a mishap.

Galvano-cautery Puncture, in suitable cases, is a useful adjunct to the treatment by rest. Under cocaine, and by indirect laryngoscopy, the terminals here figured (Fig. 48) are brought to a white heat and plunged into infiltrated and even into ulcerated areas, as deep as the underlying healthy tissue. Several punctures are made at one sitting, the *séance* being repeated monthly or thereabouts. There is very little reaction induced and so no great œdema, but care should be taken not to plunge the heated cautery point as deep as the underlying cartilage.

The use of the galvano-cautery puncture is confined, for the most part, to cases which have reacted favourably to the rest treatment. The patient should be free from fever and otherwise in good general condition. The lesions most likely to benefit are those in the neighbourhood of the glottis. But it is also of service in the more chronic lupoid types. It acts by inducing fibrosis of the tuberculous areas.

Results.—By a judicious combination of rest and the galvano-cautery Sir StClair Thomson has been successful in obtaining permanent cure in 25 per cent. of the cases treated. These were admittedly early cases, but the result emphasizes the importance, first, of the prompt recognition of incipient lesions, and secondly, of their no less prompt treatment.

Other Curative Methods.—Remarkable results have been claimed for *heliotherapy*. It may be applied by means of a self-retaining nickel reflector devised by Kowler, of Mentone, or directly by suspension or through the directoscope.

Finsen Light.—Strandberg reports cure in 53 per cent. of cases by using light from an arc lamp of a special pattern, as a light-bath for the general body surface. He recommends its combination with the usual methods of treatment.

Diathermy puncture has been tried, but it is inferior to the galvano-cautery, as it induces less fibrosis.

Treatment by *X-rays* is under trial.

Palliative Treatment.—In cases where dyspnœa is present as a result of laryngeal obstruction by the disease, *tracheotomy* may be required as an urgent measure, but its influence upon the pulmonary disease is not good as a rule.

In the terminal stages of laryngeal tuberculosis where the patient's life is made miserable by odynphagia, the distress of swallowing may be mitigated by the insufflation or by the inspiring through Leduc's tube of 3 to 5 grains of orthoform or anæsthesin about an hour before the principal meal of the day.

It is also sometimes of value for the relief of painful deglutition to make an *injection of alcohol into the trunk of the superior laryngeal nerve*. The needle is entered so as to strike the greater cornu of the hyoid one inch behind the lesser cornu. Its point is then depressed, so that it hitches against the lower border of the greater cornu. Here the needle is in contact

with the thyro-hyoid membrane, and it is now directed downwards and forwards inside the thyroid cartilage, and while it is being pushed in this direction, the piston is slowly closed, and the alcohol injected along the course of the nerve. (After Courtenay Yorke, quoted by Sir StClair Thomson.)

When swallowing is painful and difficult we must, naturally, give the patient only soft solids or liquids to swallow, but in this matter patients may be left to choose for themselves. In like manner also they soon discover what attitudes to adopt to facilitate the passage of the food, the most serviceable perhaps being that of Wolfenden, in which the patient lies face downwards on a couch, with his head over the end of it, and sucks through a tube the nourishment from a vessel placed below him on the floor.

LUPUS OF THE LARYNX

Lupus is not common in the larynx, and never appears, it is said, without evidences of the disease, past or present, in the nose or pharynx.

It occurs oftenest on the epiglottis, which is frequently destroyed by the disease. The deposit shows pale, dry-looking lupus nodules breaking down to form a dry, shallow ulcer, with little or no reactive redness about it. The epiglottis may be partially or wholly eaten away by the disease, but the process seems to stop short at its base. The arytenoids, the ary-epiglottic folds and the ventricular bands sometimes show deposits, but the cords usually escape. Cicatrization of the affected areas is common, and the process may end in glottic stenosis so severe as to necessitate tracheotomy.

Symptoms, apart from obstruction, are slight, and may be altogether absent unless the glottis is involved, in which case the voice, at first rough and hoarse, is in time entirely lost.

Diagnosis.—It is essential not to confuse lupus with tuberculosis. In contrast with tuberculosis of the larynx, lupus is a slow disease ; its advances and retreats occupy months and even years, and spontaneous cicatrization attends upon it. Moreover, the surface is dry, nodular and thickened, and it is, in all its stages, painless. It is in the chronic or lupoid type of tuberculosis that difficulty is most likely to occur, but the absence of the lupus nodule is sufficient to distinguish that form of the disease from lupus.

The *prognosis* of the disease is generally said to be favourable, but the opinion has been expressed that lupus in the larynx often undergoes a conversion into the more active forms of tuberculosis, and ends unfavourably. As to the truth of this opinion we cannot judge. Facts are wanted. This may be said, however—that if lupus ever leads to the more active forms of tuberculosis it takes many years to do so.

Treatment.—In addition to general constitutional treatment by good feeding, fresh air, sunlight, natural or artificial, and tonics, arsenic being specially recommended, the galvano-cautery puncture of the lupoid deposits

in the larynx should be carried out. It is believed that tracheotomy has a beneficial influence upon the disease.

Lupoid deposits elsewhere must be attended to (see pp. 88 and 301), and the possibility of tuberculosis in other organs, especially in the lungs, should be borne in mind.

(For radium treatment, see p. 302.)

BENIGN NEOPLASMS OF THE LARYNX

Papilloma is the commonest variety of innocent new-growth. It occurs chiefly in children and young adults. In structure the papilloma is a warty growth, consisting of a core of connective tissue with blood-vessels and an epithelial covering. Frequently multiple, papillomata vary in size from a millet-seed to a walnut. They are pale pink in colour, and present a mulberry or cauliflower-looking surface. (Figs. 49 and 50.) They are usually pedunculated, firm, elastic, and not liable to bleed.

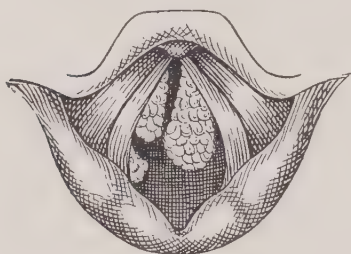


FIG. 49.—Papillomata of the Larynx
(Andrew Wylie).

Papillomata most frequently grow from the free border of the vocal cords, affecting the middle or anterior half, or the anterior commissure. When multiple, they are often scattered about in clumps elsewhere in the larynx. Indeed, they may extend into the pharynx and down into the trachea, and they have even been known to

grow on the granulation-tissue of a tracheotomy opening (Dundas-Grant). When papillomata manifest growth so luxuriant as this they should be regarded as locally infective, if not locally "malignant," and as dangerous to life, since asphyxia may be induced by the impediment they offer to the passage of the air through the glottis. This is specially remarked in children.

Diagnosis.—A papillomatous clump on one vocal cord in an adult over middle age should be suspected, as epithelioma in its early stages may present a papilloma-like surface. The malignant growth, however, is accompanied with infiltration of the tissue around it. All laryngeal growths, when removed, should be examined by a competent microscopist.

Allusion may here be made to a rare form of papilloma, first appearing in adult life, in which the growth forms a sort of fringe attached to more or less of the free edge of one cord. The tips of the several little projections are pale, and sometimes have a curved, almost a horn-like shape. This appearance is highly suspicious, but microscopic examination reveals no sign of malignancy. When removed they are apt to recur, though slowly, and after many years may end in obvious epithelioma. That being so, the case should be kept under observation, and if recurrences continue, probably

the safest procedure would be to perform thyro-fissure (see p. 151), and to remove the growth and the affected cord as if they were already cancerous, and that in spite of the benign microscopic findings.

In children, persistent hoarseness, or stridor, whether continuous or recurrent, should lead to an examination for papillomata. Children can be trained to submit cheerfully to examination with the laryngeal mirror.

Prognosis.—In view of the strong tendency to recurrence, which may continue from childhood until middle age, and occasionally to prolific growth, the prognosis should be guarded. Nevertheless, when papillomata are thoroughly removed, their recurrence is not common. The difficulty, however, lies in their thorough removal.

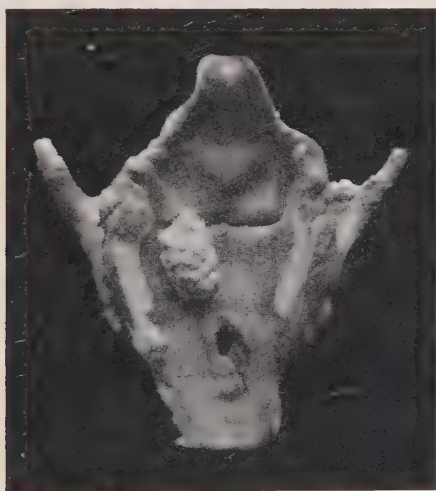


FIG. 50.—Interior of Larynx showing Papillomatous Mass. (Andrew Wylie's case.)

Treatment.—In Adults: By *Indirect Laryngoscopy under cocaine*, and using the laryngeal forceps of Morell Mackenzie, Jurasz or Dundas-Grant (Figs. 55 and 56), the growths are seized and evulsed, each clump being attacked and systematically eradicated. Several *séances* may be required to clear out all the colonies.

The same may be performed under *Direct Laryngoscopy*, using Paterson's or the author's direct forceps. (Figs. 51 and 52.) After the operation the bases of the growths may be touched with lactic acid.

In *Children* laryngeal papillomata are most successfully dealt with by removal under suspension laryngoscopy. Chloroform is necessary, and after the apparatus has been adjusted, the growths are removed by suitably long forceps, and their bases are then curetted.

In these manipulations it is advisable to handle each growth as if it were capable of disseminating its species by contact. As soon as the

papilloma is seized, therefore, it is removed in such a way as to avoid contact with the mucous membrane of the larynx or pharynx.

A low tracheotomy is often a necessary antecedent of this operation in children, and if there has been a recurrence of the growths the child should wear the tube for a considerable period, if necessary for several years, as the

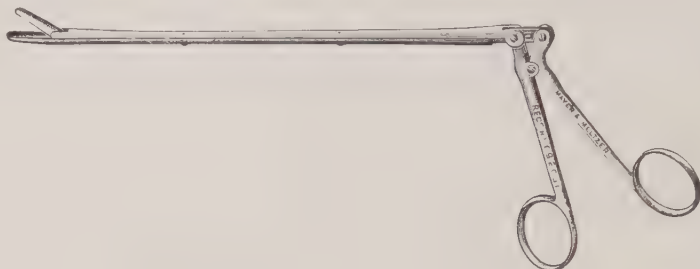


FIG. 51.—Paterson's Direct Laryngeal Forceps.

tendency to recurrence diminishes and may even disappear when the tube is retained.

Internally the prolonged administration of arsenic or iodide of potassium may be tried.

For proliferating and recurring papillomata many other remedies and plans have been tried, the value of which is unsettled, as success in a small number of cases is no criterion of the general utility of any particular method of treatment.

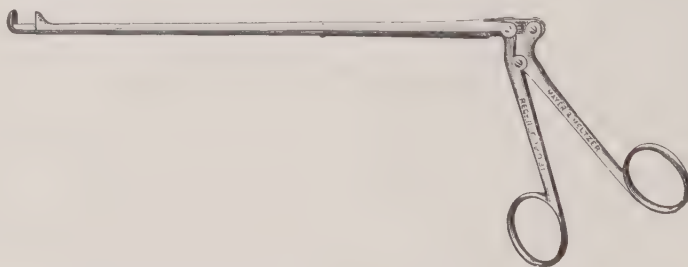


FIG. 52.—The Author's Direct Laryngeal Forceps.

Radium, for instance, has many advocates, and Milligan has devised an apparatus which enables him to keep a radium tube, inserted through the mouth, in the lumen of the larynx. He employs 20 to 30 mgrm., screened by silver or platinum, and leaves it *in situ* for two hours ('Proc. Roy. Soc. Med.,' Laryng. Sect., vol. xvi, p. 46). Seymour Jones, on the other hand, has found radium ineffective (Journ. of Laryng., vol. xxxv, p. 113).

X-rays, highly recommended for cutaneous warts, have also been tried.

The removal of the growths through a *thyro-fissure* (see p. 151) is sometimes adopted. It runs the risk, particularly in children, of permanently

damaging the voice. Moreover, it does not ensure the non-recurrence of the growths.

Fibromata, which are not uncommon tumours in the larynx of adults, are usually found on the upper surface of the anterior half of one or other vocal cord. Wyatt Wingrave has shown that they are frequently the product of the organization of localized submucous hæmorrhage. Their structure is of fibrous tissue, frequently oedematous, and shows traces of their hæmatogenous origin.

This neoplasm is generally solitary, sessile, light pink or red, and smooth. It is, however, occasionally stalked, and may further resemble a papilloma in being granular on the surface.

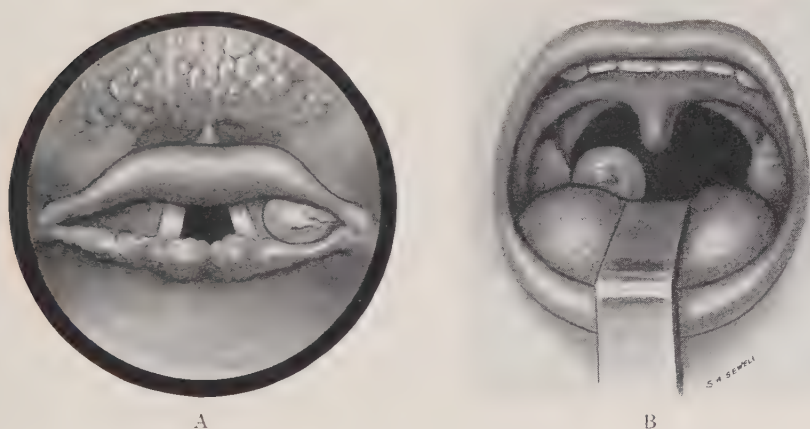


FIG. 53.—Pedunculated Cyst attached to Left Ary-epiglottic Fold.

A. Laryngoscopic image of the cyst lying in the larynx. B. View of cyst coughed on to opposite side of base of tongue. (From drawings by Dr. W. B. McKelvie.)

Its removal may be effected under cocaine, either by indirect, or very precisely by direct laryngoscopy, and when removed it does not tend to recur.

Cysts, usually developing from a mucous gland, are found at times on the epiglottis (Fig. 53), and more rarely on the ventricular bands, vocal cords or arytenoid region. They appear as smooth, tense, globular and semi-translucent bodies, which, especially on the epiglottis, may attain to a considerable size without attracting any attention. Cases are on record where they have caused death by sudden asphyxia.

Treatment.—Puncture or incision of the cyst being insufficient, a portion of the wall should be excised. Even then there may be a recurrence.

For most of the information regarding the following, the rarer neoplasms

of the larynx, we are indebted to Irwin Moore. (See 'Journ. of Laryng.,' vols. xxxv, xxxvi, xxxviii and xl.)

Adenoma is the rarest, as there are only some 13 cases recorded. Of mucous gland structure and sometimes containing cysts, it takes the form of a sessile growth, with an irregular surface, and, if attached to a vocal cord, may closely resemble epithelioma.

Angeioma is more common, there being nearly 80 cases on record. It is usually of the cavernous type and may be associated with similar tumours elsewhere. Angeiomata of the larynx rarely exceed a filbert in size and appear as dark grey or purplish plaques, which may be situated anywhere in the larynx, but are most frequently found on the upper surface and margin of the cord.

If small they may give rise to no symptoms. Occasionally their nature is not recognized until an effort is made to remove them, when the hæmorrhage, which may be difficult to arrest, discloses their character. In the ordinary way the symptom which usually attracts attention to their presence is hæmoptysis.

Treatment.—Small angeiomata on the cord may be avulsed by forceps. But if hæmorrhage is feared—and it is to be feared in most—a low tracheotomy should first of all be performed in order to prevent blood gravitating into the bronchi and lungs. The safest method is removal by thyro-fissure (see p. 151), provided the angeioma can be avoided when incising the cartilage. It is then removed by blunt dissection carried wide of the neoplasm.

Apart from removal, radium is often successful in destroying the tumour. Diathermy coagulation, also, is worthy of trial.

Enchondroma.—Between 60 and 70 cases have been recorded. This tumour, which is solitary, sessile and immovable, most frequently grows from the posterior plate of the cricoid and projects into the larynx, where it is visible on inspection as a smooth projection in the subglottic region beneath one or other cord. The mucous membrane covering it is usually normal in hue or but slightly hyperæmic.

Sometimes the growth springs from the thyroid cartilage and may be palpable from without; and occasionally it manifests sarcomatous characters.

They are best removed by laryngo-fissure, that is to say, by division of the cricoid as well as the thyroid cartilage, after a preliminary tracheotomy. Complete removal of the cricoid may be necessary, and as that leads subsequently to stenosis, it necessitates the permanent wearing of a tracheotomy tube.

When the enchondroma projects into the neck, removal by the external route may be practicable.

When sarcomatous, only laryngectomy can hold out any prospect of cure.

Lipoma.—A few remarkable cases of lipoma are on record. Bland-Sutton tells of one attached to the ary-epiglottic fold, and so generously

pedunculated that the patient was able to project the tumour into his mouth. They may cause sudden death from asphyxia.

The *Symptoms of benign neoplasm* in the larynx naturally depend upon the position and size of the tumour. Quite a small growth, if it is on the edge of the cord, will attract early attention by inducing hoarseness, while,

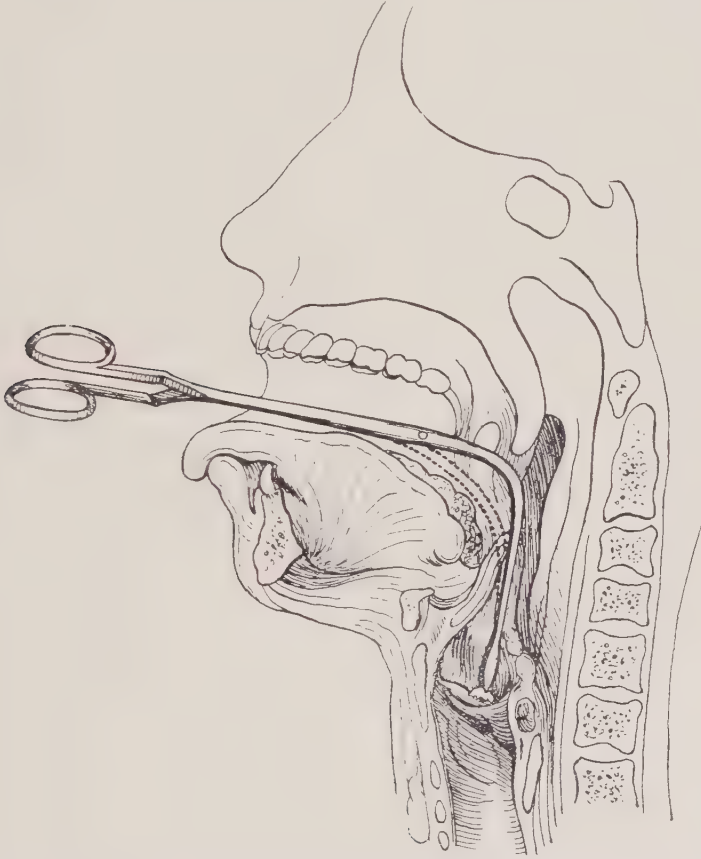


FIG. 54.—Removal of a Neoplasm from the Vocal Cord by the Indirect Method (from 'Diseases of the Throat and Nose,' by Morell Mackenzie).

on the other hand, a tumour on the ventricular bands or on the epiglottis, for example, can grow to quite a large size before the patient is aware of anything amiss, and then the first symptoms to appear may be stridor and dyspnoea.

On examination the cause of the symptoms is, as a rule, easily detected, but small growths located about the anterior commissure readily escape a casual inspection.

Treatment.—The removal of small, solitary laryngeal neoplasms without injury to the cord is a little operation necessitating skilled and delicate manipulation, whether undertaken by the direct or by the indirect method. Efficient local anæsthetization is essential (see p. 104), and the patient should be trained to co-operate with the surgeon in fixing and moving the head to command.

For tumours on the edge of the cords, Dundas-Grant's laryngeal forceps (Fig. 55) are useful, while Morell Mackenzie's forceps are probably the most popular for tumours situated elsewhere.

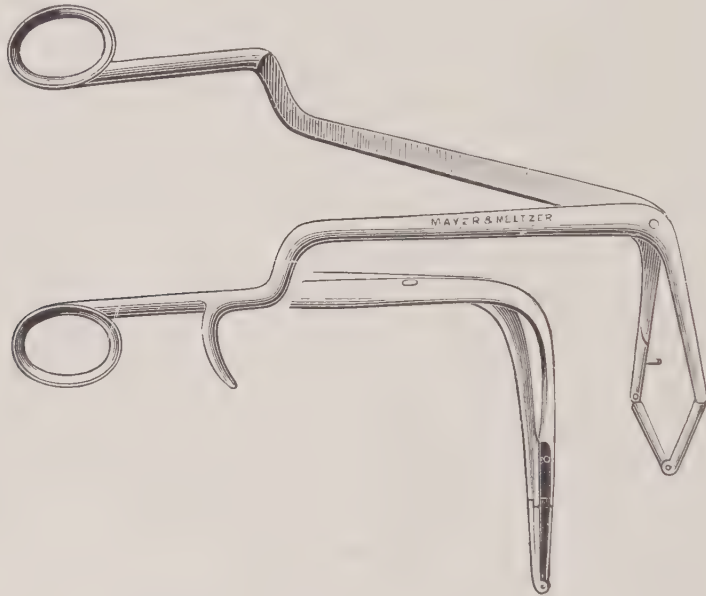


FIG. 55.—Dundas-Grant's Laryngeal Forceps.

For the removal of small, tender growths, such as solitary papillomata, Jurasz's forceps (Fig. 56) are highly suitable.

Methods.—(a) *Indirect.*—The patient and surgeon are seated face to face as for an indirect laryngoscopy (see p. 92). An assistant stands at the right side of the patient and takes hold of the protruded tongue. The larynx is anæsthetized as detailed on p. 104. The forceps, having been sterilized and warmed, are passed by the surgeon into the mouth sideways so that their right-angled bend is lying horizontally. When their point has reached the back of the tongue the surgeon brings the handle of the forceps into the sagittal plane, so as to turn the right-angled bend of the instrument from the horizontal to the vertical. It is then slipped over the epiglottis under the guidance of the laryngeal mirror. In subsequent movements it is to be remembered that the mirror shows the image reversed, and that

when the forceps are moved backwards they seem to be going forwards, and *vice versâ*.

If the growth is situated laterally, as on one cord, the forceps should be passed into the larynx from the side opposite to the growth, slanting obliquely towards it. At the same time, the operator draws the shaft of the instrument a little towards him and against the base of the epiglottis (see dotted outline on Fig. 54), as this opens up the larynx and facilitates inspection. These manœuvres, which a little practice makes almost instinctive, enable the operator to keep the jaws of the instrument always in view and under control, so that he can visually direct their application

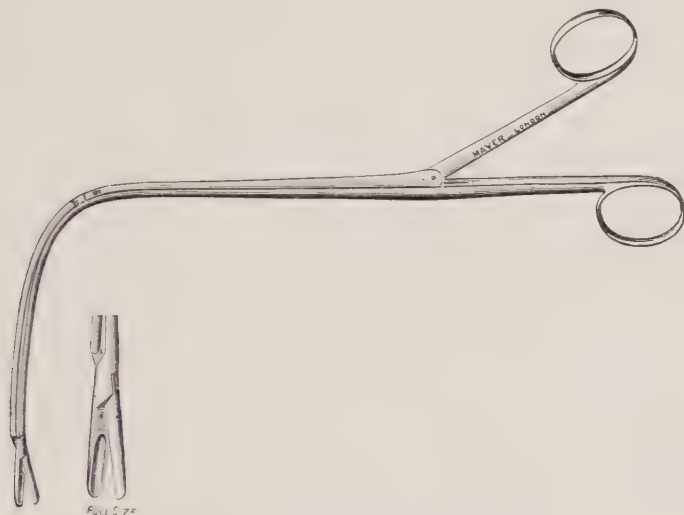


FIG. 56.—Jurasz's Laryngeal Forceps.

to and their seizure of the growth, which is thereupon detached with a sharp, short pull.

This method does not apply to the Dundas-Grant forceps, which are more automatic in their action. They, on the other hand, are passed into the larynx closed; brought into the middle line, advanced until their point reaches to the subglottic space, opened, closed again, and removed closed. The growth, if successfully trapped, will be found fixed at the joint in the end of the instrument.

The growths most difficult of removal are those which are situated in or near the anterior commissure, as they cannot so easily be kept in view. In order to grasp them it may be necessary to turn the instrument—Jurasz's or Mackenzie's forceps in this case—a little to one side. Pressure backwards by the assistant on the thyroid cartilage from the outside often helps.

In removing a growth from the vocal cord care must be taken not to remove a piece of the cord along with the tumour.

(b) *Direct*.—Anæsthetization as before. The laryngeal tube-spatula is inserted (see p. 97), and by means of suitable direct forceps (Figs. 51 and 52) the growth is seized under inspection and removed.

Operating by the direct method is easier for the surgeon. It is also more precise. But in a stout patient with a short, thick neck and a full set of natural teeth, it may be difficult if not impossible to pass the direct tube without causing him a great deal of discomfort. In any case, indeed, the indirect method makes very much less demand upon the patient's fortitude. On the other hand, it makes, as has already been said, much more demand upon the dexterity of the operator.

After the larynx has been cleared it should be rested for several days by the patient keeping silent.

These last varieties of neoplasm, unlike the papillomata and the malignant group, do not readily recur. If, therefore, recurrence does take place, the diagnosis should be carefully re-considered.

MALIGNANT NEOPLASMS OF THE LARYNX—CANCER OF THE LARYNX

Sarcoma of the larynx is very rare. As we saw in discussing enchondroma, that variety of growth is sometimes sarcomatous.

Carcinoma.—The common type of cancer of the larynx is epithelioma. It occurs either as a primary growth or by extension from neighbouring parts. Infection by metastasis from distant organs does occur, Logan Turner having recently reported a case secondary to a hypernephroma ('Journ. of Laryng.,' vol. xxxix, p. 67), but it is exceedingly rare.

The factors which predispose to the cancerous process in the larynx are not yet clearly determined. It is commoner in males than in females, and, like cancer elsewhere, it is commoner after than before the age of forty. Nevertheless it does not spare women, and it has been observed before middle life not infrequently.

Chronic laryngitis, laryngeal syphilis and other forms of local irritation perhaps favour the onset of the disease, but it has not yet been definitely proved that they do so.

Clinically, three varieties of laryngeal cancer are distinguished according to their site of origin :

- (1) *Intrinsic Cancer*, when the growth is limited to the vocal cords, the ventricular bands, the ventricles, or the subglottic region as far as the upper border of the cricoid cartilage ;
- (2) *Extrinsic Cancer*, when the epiglottis, the arytenoid region, the ary-epiglottic folds (the epi-laryngeal region), or pyriform sinuses are attacked ; and—
- (3) *Mixed* cases, where areas coming under both of the former are implicated.

Intrinsic cancer is usually of slow growth, and may remain confined to the larynx for prolonged periods, sometimes even for years. Extension to

neighbouring lymphatic glands is often delayed, and if, at this stage, it is thoroughly removed, it shows less tendency to recur than cancer elsewhere. *Extrinsic and mixed cancer*, on the other hand, grows more rapidly. It quickly infects the lymphatic glands. It is difficult to remove completely; and when removed it is apt to recur speedily.

The reasons which have been advanced for this clinical difference are as follows :

First, it has been said that the lymphatic system of the larynx does not communicate directly and freely with neighbouring lymphatic glands. This statement is probably incorrect.

Secondly, it is worthy of remark that the area of extrinsic cancer differs from that of intrinsic cancer in being exposed to the sepsis of the mouth and food-channels. Sepsis, as is well known, stimulates the rate of growth of cancer.

Thirdly, the cartilaginous framework of the larynx is looked upon as opposing the extension of the disease.

Fourthly, as cancerous growths manifest considerable difference in the degree of their malignancy, it is suggested that epithelioma of the intrinsic area, and particularly of the vocal cords, like epithelioma of the lip, is of a low malignancy, and that its slow growth and delayed gland-infection are merely the inherent characters of a mild type of cancer. We may regard this suggestion as more probable than any of the others.

Whatever the reason, it is of great importance to be able to determine the exact site and extent of the growth.

At the same time, while it is true that intrinsic cancer is of a low malignancy, it would be foolish to ignore the fact that it is an epithelioma, and that sooner or later it begins to spread, infecting the neighbouring glands and ultimately destroying the patient.

The glands which become enlarged in supraglottic cancer, whether intrinsic or extrinsic, are those found at the level of the upper border of the thyroid cartilage, between the larynx and carotid vessels. In infra-glottic cancer, the glands in the middle line in front of the cricoid and trachea, or those in the carotid chain on a level with the cricoid, are the most liable to infection.

Symptoms.—The early stages of laryngeal cancer may pass without giving any warning of the presence of the disease, as, for example, when the growth begins on an ary-epiglottic fold. But when the cord is the first seat of the disease, hoarseness sets in as an early symptom, and it is this generally which brings the patient to the doctor. The amount of hoarseness is often surprisingly great in comparison with the extent of the growth, but the symptom is produced not so much by the bulk of the new growth as by an infiltration which quickly leads to interference with the mobility of the cord.

In intrinsic cases, as the disease progresses, the hoarseness become more pronounced until only a rough whisper is audible.

In extrinsic cases, the first symptom to attract notice is generally

difficulty and pain on swallowing. But, as we have said, the disease is often far advanced before any signs arise, and it is by no means unusual to find that the first symptom noticed by the patient is the presence of enlarged glands in the neck.

Both types tend, as the bulk of the growth increases, to interfere more and more seriously with respiration, so that in inoperable cases tracheotomy, as a measure of relief, is almost always required.

In the final stages, the pain on swallowing becomes very severe; the saliva is allowed to dribble from the mouth, the breath is fœtid, until emaciation, hæmorrhage, cachexia and progressive misery and weakness or the occurrence of septic pneumonia lead to death.

Examination.—Cancer of the larynx assumes many forms in its earlier appearances, but it presents also certain characters common to all, and these are generally sufficient to awaken suspicion and sometimes to establish the diagnosis beyond doubt.

On the vocal cord in its earliest stages, while it may attack any part of the cord, it more frequently begins in the middle or anterior third than in the posterior area (StClair Thomson, J. Moore). It most frequently appears either as a white or greyish warty growth on one cord, resembling papilloma (see p. 138), or as a diffuse, ill-defined growth on the surface of the cord, infiltrating and thickening its substance, or else it appears as an uneven reddish fringe along the edge of the cord.

Not infrequently the disease originates in the subglottic region of one side, in which case the corresponding vocal cord is reddened and becomes immobilized at an early stage, while the growth itself is generally visible as a reddish mass protruding from below the cord.

Elsewhere in the larynx epithelioma shows as a deep pink infiltration with a rough, uneven surface. On the epiglottis, as might be expected, the colour is lighter—greyish or pink—and here ulceration begins early.

At first the progress of the disease is slow, and in the vocal cords it may seem for prolonged periods to be almost stationary, but after ulceration has taken place the disease extends more rapidly, spreading, in the case of the cords, backwards to the interarytenoid region, or forward to the anterior commissure, and thence to the other cord, so that the glottis may be encircled by the disease. Thence it spreads up into the ventricular bands, and down, but more slowly, into the subglottic region, until, it may be, the whole of the larynx becomes filled with the sprouting growth. (See Fig. 65.)

When the extrinsic region is affected, the route taken by the infiltration is upwards towards the pharynx, or outwards on to the pharyngeal wall of the larynx. (For "post-cricoid cancer," see p. 78.)

The epitheliomatous ulcer presents an irregular, greyish or whitish floor. It bleeds readily and it is very hard and tender to the touch. As Stuart Low and Wilfred Trotter have pointed out, it is possible not infrequently to palpate laryngeal growths with the forefinger inserted through the mouth, and as the information thus obtained is of great value, the attempt should always be made.

In its early stages on the cord the cancerous growth often gives the impression of deep infiltration by reason of the thickness and reddish colour of the mucosa around it. The diseased surface has a softish appearance, while a congestion of the affected cord as compared with the other cord is always a suspicious sign. Considerable emphasis is usually laid upon the fact that a cord affected with cancer manifests on movement a heaviness or sluggishness as if it were loaded with some burden, and this is certainly a phenomenon to be noted. But it is not an early sign save in a minority of cases, as when the growth has started in the subglottic region. Otherwise it indicates an advanced case and is of unfavourable prognosis. Moreover, it is not a reliable sign of cancer as one finds it also in unilateral tuberculosis when that disease affects the ventricular band. Finally, however, the infiltration and ulceration of cancer tend to immobilize the cord altogether.

In the later stages, the appearances, if the case has been watched, become unmistakable. The foul, fungating ulceration, the immobility of the cord and the stony hard cervical glands leave no doubt as to the nature of the disease. But even in its later stages, the real disease may be masked by septic perichondritis, and this, in point of fact, may be the first event which leads the patient to seek relief, so that any laryngeal inflammation with external tenderness should always be closely watched for future developments.

Diagnosis.—Hoarseness lasting longer than a fortnight, at any age, should lead to a laryngoscopic examination, with the thought of papilloma in children; of tuberculosis in early adult life; of cancer in later life.

The diagnosis of cancer of the larynx is often a matter of great difficulty. The late Sir Felix Semon, describing his own experiences twenty years ago ('Brit. Med. Journ.,' February 2nd, 1907, p. 245), stated that an error was made to begin with in no fewer than 23 per cent. of his 34 cases, 5 per cent. of them being tuberculosis; and the difficulty still remains.

Cancer of the larynx may be mistaken for (a) simple chronic laryngitis; (b) syphilis; (c) tuberculosis; or (d) a benign tumour.

In *chronic laryngitis*, pachydermia affecting the cords comes to resemble cancer if the pachydermatous thickening affects one cord more than the other. The question then arises whether epithelioma is supervening upon the chronic laryngitis. In that case the likelihood of epithelioma will be strengthened if the suspected cord shows a lagging movement as compared with its neighbour, or if an ulcer develops on the edge or surface of the cord and persists. The irregularities of the pachydermatous cord, it must be confessed, are themselves often hard to distinguish from an ulcer.

Syphilis in its several forms may be diagnosed from the comparatively short history, from the existence of signs of syphilis elsewhere, from the preference manifested by the disease for parts other than the cords, and from the result of anti-syphilitic treatment. But it should be remembered that in the larynx, just as elsewhere, a certain amount of **improvement after**

the administration of potassium iodide should not be regarded as definitely excluding cancer.

A syphilitic perichondritis may be indistinguishable from cancerous perichondritis.

With regard to the Wassermann reaction, we must remember that a positive Wassermann only indicates that the patient is a syphilitic; it does not decide the nature of any particular lesion. (See p. 86.)

From *tubercle*, cancer is distinguished by the preference of the latter for the cords; by the patient being, as a rule, over middle age; by the absence of disease in the lungs and of tubercle bacilli in the sputum. In addition, the tubercular ulcer in the early stages is shallow, pale, and shows no infiltration around the edges. At the same time cases come for diagnosis in which it is not easy to come to a decision, as we have already seen. (See p. 132.) In such puzzling circumstances the most reliable test is time. In tuberculosis the picture changes more rapidly than in early cancer, and the changes bring more and more into prominence the formerly latent tuberculous characteristics.

Innocent tumours of the larynx are of slow growth, show no tendency to infiltrate the surrounding structures, do not ulcerate, and do not interfere, save mechanically by their bulk, with the mobility of the affected cord.

Papilloma, in its tendency to recurrence and to diffusion, is the benign growth which most closely resembles cancer, and papillomatous neoplasms over the age of forty years always arouse apprehension. But the appearance of a second or third papillomatous cluster some distance from the first would tend to relieve anxiety. Nevertheless, as we have already remarked, all apparently benign neoplasms of the larynx should, after removal, be handed to a competent microscopist for examination. And indeed in all cases of doubt, a portion of the diseased tissue may be removed for microscopic examination.

This little operation can be undertaken under local anæsthesia, and it is important to obtain the specimen from that part of the diseased area which shows the greatest change, and to include in the portion removed all the layers of the tissue, superficial and deep. That being so, the writer advises the direct method as enabling the operator to be more precise in his manipulation. Punch forceps of a sensibly large pattern should be employed, otherwise the surface only will be nibbled.

If the microscopist's report is glaringly contrary to what is suggested clinically, a second, or even a third specimen should be obtained and examined, and the same is true when the report is uncertain in tone. In this, also, as in many other clinical "tests," a negative response is of less value than a positive.

It is necessary to add that the removal of a piece of the suspected tissue from the larynx for microscopic examination is not without danger, as it is sometimes followed by a rapid change for the worse in the larynx. That being so, many authorities either decline altogether to adopt it, or will only do so if the patient gives his consent to immediate operation should the

disease prove to be cancer. A mishap of this kind is, however, probably due to septic infection of the cancerous area, and that can be obviated by a preliminary cleansing of the mouth and pharynx, and by cauterizing the wound made by the forceps with diathermy.

Finally, perhaps the most important of all factors in diagnosis is the effect of time upon the laryngeal appearances. In any doubtful case, short of urgency, the larynx may be inspected from week to week, or, if the progress is slow, at even longer intervals, while in the meantime the patient may be receiving anti-syphilitic remedies. The changes effected by time are frequently illuminating.

As has already been noted, the occurrence of perichondritis may be the first sign of cancer of the larynx, and in that case, so long as the acute inflammation is in existence, the underlying malignant disease may be entirely masked.

The *Treatment of Cancer of the Larynx* is radical or palliative according to the site and extent of the disease. The radical treatment consists in operative removal, by (a) thyrotomy (thyro-fissure); (b) total laryngectomy; (c) subhyoid and transhyoid pharyngotomy.

THYROTOMY (THYRO-FISSURE. LARYNGO-FISSURE)

(See Irwin Moore's articles in 'Journ. of Laryng.,' vol. xxxiii.)

Description.—The thyroid cartilage is opened through an incision in the middle line and the growth excised through the opening.

Indications.—Intrinsic cancer of larynx limited to one side in which the cartilage is not involved; the most favourable cancers are those limited to one cord.

(Thyro-fissure is also sometimes resorted to for the removal of foreign bodies impacted in the larynx when they cannot be removed *per vias naturales*; for cicatricial stenosis; and for the removal of papillomata and other benign neoplasms.)

Contra-Indications.—*Local.*—The operation is unsuited for cancer which has grown beyond the "intrinsic" limits, and for cancer which affects both sides of the larynx, unless perhaps when the growth has passed over to the other side by the anterior commissure, and only to a very slight extent.

It is also unsuited to cases in which the growth has penetrated the thyroid cartilage—an extension which may be detected by palpation of the thyroid ala from without, previous to operation.

General.—Disease of the lungs, heart or kidneys. Experience proves, however, that senility, if fairly robust, is no contra-indication.

Operation.—As in all operations on the larynx, pharynx or nose, the mouth is cleansed previous to operating, by the removal of all carious teeth, and the administration of an antiseptic mouth-wash.

On the operating table the patient lies on his back, with a small pillow under the shoulders, to extend the neck, and render prominent the larynx and trachea. The surgeon, wearing his mirror or a head-light, stands on the right side of the patient, with his assistant opposite to him on the other side. General anæsthesia by chloroform is employed.

An incision is made in the middle line of the neck from the level of the

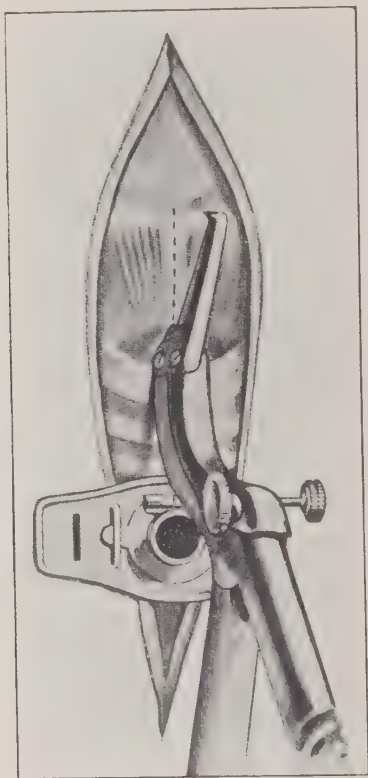


FIG. 57.—Shears cutting through the Thyroid Cartilage. One blade has been passed through the crico-thyroid membrane into the interior of the larynx (from Irwin Moore).

hyoid bone to the upper edge of the sternum, and the soft parts are divided in this line until the thyroid and cricoid cartilages, the trachea and the isthmus of the thyroid body are exposed and clearly defined. The thyroid isthmus is divided in the middle line to expose the underlying trachea, and after injecting a few drops of a 10 per cent. solution of cocaine into its lumen (see p. 194), the trachea is opened and a tracheotomy tube inserted. The anæsthetic is now administered through the tracheotomy tube.

Next, the thyroid and cricoid cartilages having been cleared in the

middle line, the former is divided from its lower border to its notch by means of thyroid shears (Fig. 57), or, if the cartilage is ossified, by means of Irwin Moore's thyroid saw. The alæ of the thyroid cartilage are now separated, and held apart by retractors so as to expose the interior of the larynx. Some of the mucous membrane of the larynx lining the thyroid cartilage may require snipping, and one has sometimes to divide partially

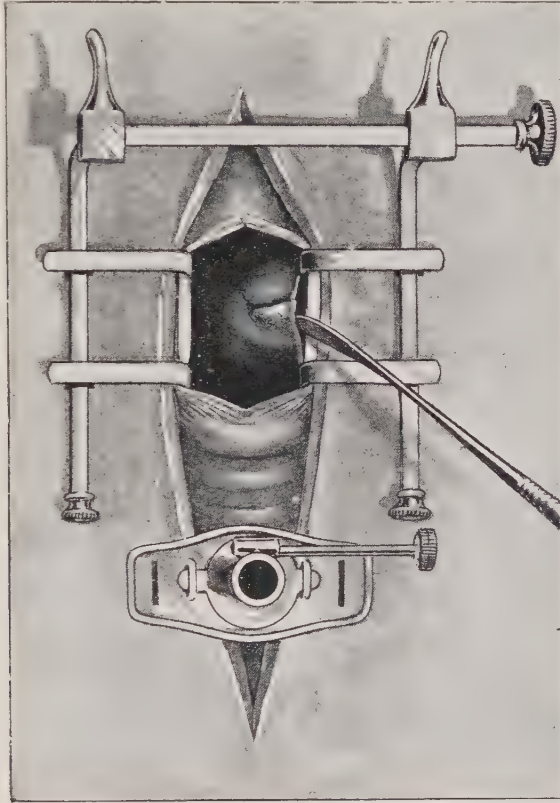


FIG. 58.—Larynx opened and elevator passing under the perichondrium to separate the growth-bearing tissue from the thyroid cartilage (Irwin Moore).

the thyro-hyoid membrane in the middle line. A sponge is now packed up towards the pharynx to prevent contamination from the mouth discharges, and another small sponge attached to a string is passed through the laryngeal opening down into the trachea as far as the tracheotomy tube in order to intercept any blood that may flow down, and the laryngeal cavity is packed for a few minutes with gauze soaked in 5 per cent. solution of cocaine in solution of adrenalin (1-1000).

This having been removed, the infiltration of the growth will show up

as a dull red area against the surrounding anæmic laryngeal mucosa; the growth always proves to be more extensive than it appeared on laryngoscopy.

A blunt periosteum elevator is then insinuated into the cut edge of the laryngeal mucosa of the affected side between the thyroid ala and its perichondrium (Fig. 58), and working backwards and up and down, we separate

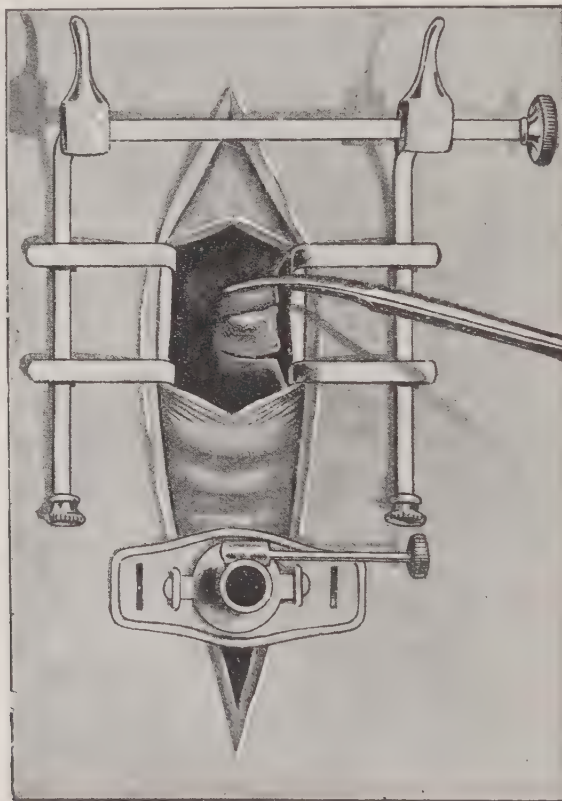


FIG. 59.—The growth-bearing tissue having been separated from the cartilage it is being isolated by scissiors (Irwin Moore).

the soft tissues bearing the growth in an entire mass from the cartilage. With curved scissiors the separation of the growth is completed by successive snips carried through the elevated mucosa, above, below and beyond the diseased area, the division passing through healthy tissue about half an inch clear of the growth all round. (Fig. 59.) Care is taken to avoid touching the area of actual disease, as that might contaminate the rest of the wound. The excision, indeed, may be most safely accomplished with the diathermy knife, care being taken not to touch the cartilage.

In effecting this removal, the arytenoid region should if possible be spared. If it must be included, the surgeon must be prepared for smart hæmorrhage, and also for some difficulty in deglutition during convalescence. The former can be stopped by pressure forceps and ligatures; the latter avoided by feeding the patient through a nasal tube for ten days.

After removal of the mass, a small vessel in the neighbourhood of the arytenoid is liable to bleed and should be ligatured. For the rest, as in all neck operations, the patient is allowed to come round partially from the anæsthetic, and his neck is relaxed by flexing the head so as to reveal all bleeding points, in order that they may be ligatured. This completed, and the pharyngeal and tracheal sponges removed, the separated thyroid alæ are brought together by catgut sutures passed through the perichondrium. The thyro-hyoid membrane, if it has been divided, is also sutured. Finally, the skin is sutured with silkworm gut, and a light dressing applied.

The tracheotomy tube should remain *in situ* for 24 hours, in case bleeding should occur while the patient is semi-conscious, as that may lead to death by asphyxia from the blood trickling into the lungs.

Difficulties.—The common difficulty is that of separating the divided thyroid alæ sufficiently to permit of satisfactory inspection and manipulation of the interior of the larynx. Relief may be obtained by incising the thyro-hyoid membrane or the upper half of the crico-thyroid membrane.

After-treatment.—During the first twenty-four hours the patient is watched for shock and hæmorrhage, but as soon as he is able, he should be propped up into the sitting position, as this eases his coughing and facilitates swallowing. The mouth should be kept clean by frequent washing-out, and it is a wise precaution to have all food and drink sterilized.

The danger is septic pneumonia from the entry of septic material into the bronchial system, but the danger can be avoided by strict attention to the above rules.

The patient should be allowed to get up out of bed as soon as he feels inclined.

Results.—The results of thyrotomy for cancer vary so widely with different operators, and the total number of available reports is so small, that a reliable general statement of results cannot be given.

Semon, with 38 thyrotomies, had no deaths due to the operation itself. Sir StClair Thomson's figures give about 6 per cent. operation-mortality. J. S. Fraser and D. Watson report 13 per cent.; while MacKenty, out of 8 thyro-fissures, lost none as a result of the operation.

Of recurrences, Semon's statistics give 23 per cent.; Thomson's, 22 per cent.; Fraser and D. Watson, 13 per cent.; while of MacKenty's 8 cases no fewer than 7 died of recurrence.

Probably the results depend largely upon the cases selected for the operation. Thyrotomy should be reserved for the very earliest stages of the disease.

Sir St. Clair Thomson warns us not to mistake a granuloma appearing in the anterior commissure shortly after the operation for a recurrence.

The result as regards the voice is generally remarkably good. The scar-tissue seems to gather up to form a new vocal cord, and the patient recovers a useful amount of phonation.

Recurrences are to be watched for, and may not appear for many years after the operation.

LARYNGECTOMY

Description.—The whole larynx, including the cricoid, thyroid and arytenoid cartilages with their internal structures are removed in one piece. (See Fig. 65.)

Indications.—Cancer limited to the larynx, but exceeding the limits laid down as suitable for thyro-fissure. (See p. 151.)

Contra-Indications.—*Local.* Cancer which has extended and infiltrated tissues beyond the confines of the larynx, as up into the pharynx, or through the cartilages into the soft tissues of the neck.

Previous to the operation the laryngo-pharynx and œsophagus should be examined with the direct tubes in order to ascertain whether or not the disease has spread to those areas. If it has, but only to a slight extent, the operation may be performed and the diseased portion of those structures removed. But if they are extensively involved the operation is contra-indicated.

General.—The operation is much more extensive than thyrotomy, and should not be attempted unless the patient is otherwise robust.

The operation mortality has been considerably reduced since the method was introduced of shutting off the trachea and bronchi from the laryngeal wound.

Preparation.—The cleansing of the mouth is of the first importance; all teeth must be extracted, whether diseased or healthy, and the mouth kept clean by the frequent use of an antiseptic mouth-wash. The major operation should not be undertaken until the dental wounds are entirely healed up. (See also p. 54.) A moderate dose of antistreptococcic serum may be administered the day before the operation.

Operation.—There are two methods—that of Perier, in which the larynx is removed from below upwards, and that of Glück, from above downwards. We select the former for description.

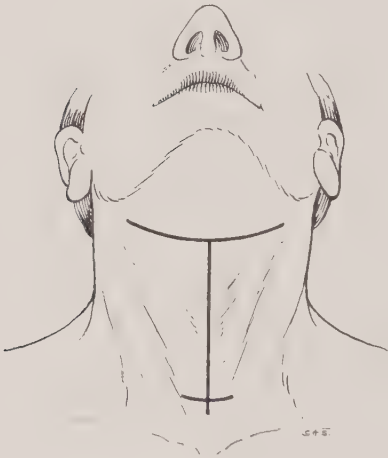


FIG. 60.—Incisions for Laryngectomy. Note the prolongation of the vertical incision below the lower transverse incision in order to accommodate the upper end of the trachea.

The position of the patient, etc., is the same as that adopted for thyro-fissure.

Removal of the Larynx.—The anæsthetic is given through the mouth and nose until the trachea has been divided; thereafter it is continued through the end of the divided trachea. (For local anæsthesia see below.)

A vertical incision is made in the middle line from the hyoid bone to

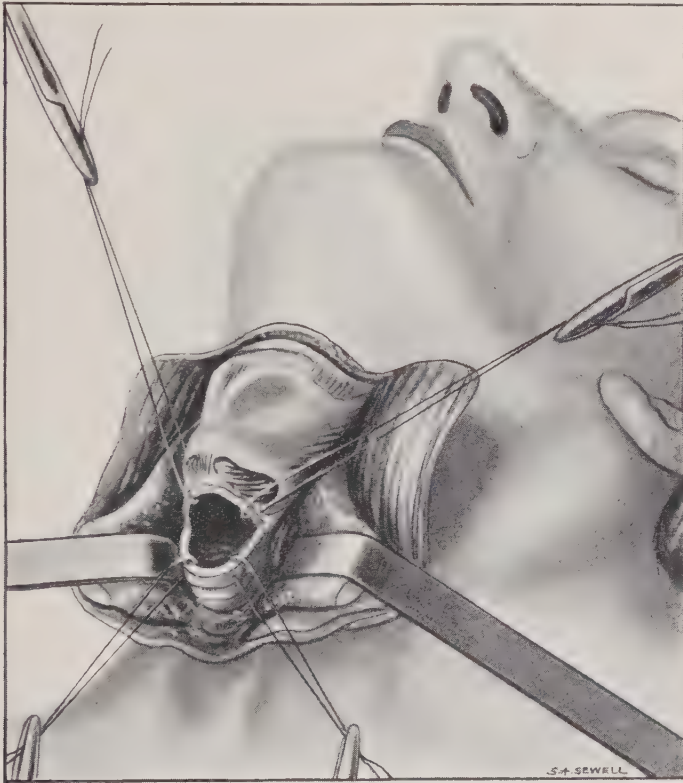


FIG. 61.—Laryngectomy. The larynx and trachea have been exposed, and the latter is in process of being divided. (Modified from Laurens.)

an inch above the episternal notch. A transverse incision is made at the upper end of the median incision along the lower margin of the hyoid bone as far as the anterior border of the sterno-mastoid muscle on either side. A second transverse incision at the lower end extends likewise from the median incision to the anterior edge of the sterno-mastoids. (Fig. 60.)

The median incision is now deepened until thyro-hyoid membrane, thyroid cartilage, crico-thyroid membrane, cricoid cartilage, and the upper two or three rings of the trachea are exposed.

The transverse incisions are deepened to the sterno-mastoid level through superficial layers of fascia and platysma.

A blunt elevator is now insinuated beneath the perichondrium over the thyroid cartilage, in order to raise the perichondrium and the tissues over it from the thyroid alae as far back as the pharyngeal constrictor on either side. This leads to the posterior edge of the thyroid cartilage. Next, with the

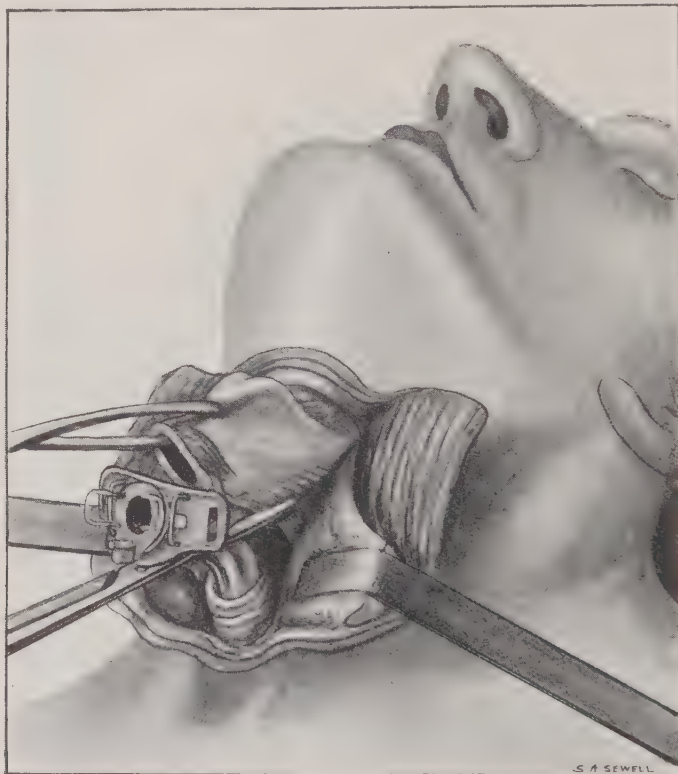


FIG. 62.—Laryngectomy. The trachea having been severed and a tube inserted, the lateral attachment of the larynx is being separated from below upwards. (Modified from Laurens.) For anæsthetic purposes a long tube is attached to the tracheotomy tube.

elevator passed under the depressors of the hyoid, these muscles are cut through at the thyro-hyoid level, revealing the lateral portion of the thyro-hyoid membrane. At the lower end of the wound the muscles are raised off the cricoid, and the lobe of the thyroid gland is cleared and left. Some venous hæmorrhage at this spot is met with.

Drawing the half-freed larynx first to one and then to the other side, the trachea is next cleared of the tissues lateral to it by blunt dissection. The trachea is now to be cut across, and in order to secure it, four sutures

are, first of all, passed through its walls, two above and two below the site of section ; this done, it is cut completely across, between the second and third rings (Fig. 61), care being taken not to injure the wall of the œsophagus, the line of division passing upwards and backwards, so that the *upper* end of the thoracic trachea is left oblique. Into this gaping upper end of the trachea a Hahn's cannula or a large tracheotomy tube is fitted,

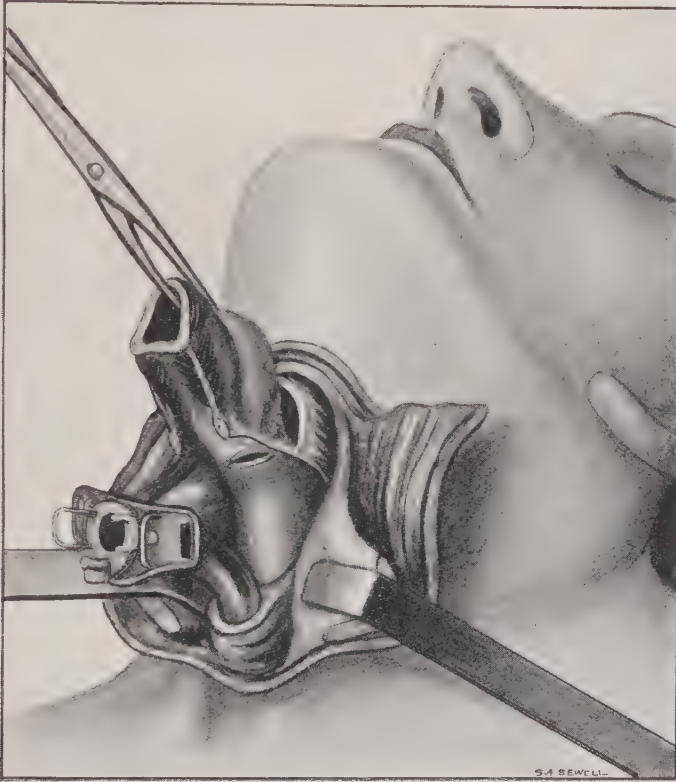


FIG. 63.—Laryngectomy. Final detachment of the larynx from the pharynx. (Modified from Laurens.)

and the anæsthetic is continued through it. The *lower* end of the laryngeal segment is now held up by means of the sutures through it, or by forceps, so as to effect its separation by blunt dissection from the œsophagus from below upwards. In this step a close fibrous adhesion between the posterior edge of the thyroid alæ and the prevertebral aponeurosis may have to be cut through. (Figs. 62 and 63.)

As this is being done, the superior laryngeal artery on the thyro-hyoid membrane is ligatured and divided, and then the upper attachments of the larynx to the pharynx and hyoid bone are cut through, and the entire

thyroid and cricoid cartilages removed together with their contents. (Fig. 65.) The epiglottis should also be removed.

The suturing of the gap left in the pharynx (Fig. 64) after the removal of the larynx is a most important step in the operation in order that the leakage of liquids from the food-passages shall be prevented, or at least reduced to a minimum. To this end the edges of the mucous membrane,



FIG. 64.—Laryngectomy. Wound after removal of larynx. Gap in pharynx to be closed by continuous suture. (Modified from Laurens.)

first of all, are closely united with a continuous catgut suture; then the muscular layer and outer coats are similarly dealt with; finally the depressor muscles of the hyoid are united over the closed gap. This suturing generally takes up as much time as the whole of the rest of the operation, but it repays the care bestowed upon it.

The upper end of the divided trachea is now relieved of the cannula, bent forward, and brought through a prolongation of the median vertical incision (Figs. 60 and 66) or through a separate stab opening made in the skin below the lower transverse incision, the circumference of the trachea

being sutured to the edges of the skin with silk passed, not through the rings, but through the mucosa only of the trachea. In this way the trachea and bronchi are shut off from the large operation wound and from its discharges—an essential step in the operation.

The skin is now sutured, all edges being brought together save at either extremity of the upper transverse wound, where two large drainage-tubes are inserted to reach as far as the site of the closed gap in the pharynx, so as to drain off any fluids that may escape from the pharynx. (Fig. 66.) A small feeding-tube is passed through the nose into the œsophagus and left there.

Local Anæsthesia is preferred by many operators, especially on the Continent of Europe, for reasons of safety. From 60 to 80 c.c. of 1 per



FIG. 65.—Larynx removed by Laryngectomy from patient shown on Fig. 67. The left half and part of the right half of the larynx is occupied by epitheliomatous growth.

cent. sol. novocaine with mxxv sol. adrenalin (1-1000) is the mixture used for infiltration. For the interior of the trachea and larynx the cocaine-adrenalin mixture mentioned on p. 104 may be employed.

First of all, the skin along the lines of the incisions is infiltrated subcutaneously, and thereafter the underlying tissues. The needle is then inserted deep to the posterior margins of the thyroid and cricoid cartilages on both sides so as to reach the region posterior to the larynx and trachea. The lateral parts of the larynx and trachea are next infiltrated, both superficially and close to the laryngeal and tracheal cartilages, in order to anæsthetize the whole area of the flaps.

The interior of the trachea receives an injection of the cocaine mixture delivered by the needle passed through the crico-thyroid membrane. If a preliminary tracheotomy has been performed the solution is painted on the margins of the opening and on the interior of the tracheal walls.

The anæsthetization of the upper orifice of the larynx and of the hypopharynx is delayed until the separation of the larynx from the pharynx is about to take place, and then 2 to 3 c.c. of the cocaine solution are injected through the thyro-hyoid membrane. (See Laurens, 'Chirurgie de l'Oreille, etc.,' Paris, 1924, p. 807.)

After-treatment.—It is difficult to obtain a water-tight pharyngeal suture, and so, after the first day or two, mouth secretions may find their way into the cervical wound, but if the drainage-tubes at the upper angles carry them off, no general infection of the wound will result.

In about a week the discharge ceases, granulation is well under weigh,

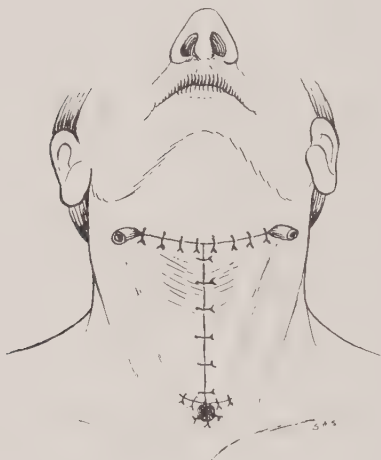


FIG. 66.—Closed Laryngectomy Wound. the tube should be sterilized.

around it. Healing in the extensive wound depends almost entirely upon the integrity of the pharyngeal sutures. If these hold, most of the wound-area will heal by primary union; if there is a little leakage, the upper zone of the wound becomes infected for several days; if they give way entirely the whole wound suffers and healing is delayed for three or four weeks.

Until the wound is closed the mouth should be frequently washed out with an antiseptic solution. The œsophageal tube is retained so long as any doubt exists as to the union of the pharyngeal wound; this means its retention for two or three weeks. Food given through

As after thyro-fissure, the patient sits propped up in bed, and as soon as he feels fit, is allowed to get up.

Alternative Method.—The trachea is fully exposed at a preliminary operation, and cut completely across, the upper end of the thoracic or lower position being brought forward and stitched to the skin around its entire circumference. This step is performed a fortnight before the major operation. The drawback to this plan lies in the fact that it renders the subsequent laryngectomy a little more difficult. Sometimes an emergency tracheotomy has preceded the laryngectomy. In that case the tracheotomy tube may be left *in situ* and the divided tracheal opening closed by sutures.

The following figures are calculated from recent statistics.

Operation mortality.—Total cases, 270; deaths from operation, 12, giving a mortality of only 4 per cent.

Non-recurrences.—Valid cases, 207; total with no recurrence, 88, equalling 42·5 per cent. of cases without recurrence.

Thus nowadays laryngectomy may be regarded as a fairly safe operation, and in spite of the respiration being carried on directly through the tracheal opening in the neck, many cases are on record of prolonged life after laryngectomy. (See Fig. 67.) Those patients, although they are altogether voiceless, nevertheless often contrive to produce sounds in the pharynx, and to "speak," so as to be understood by those about them. Moreover,

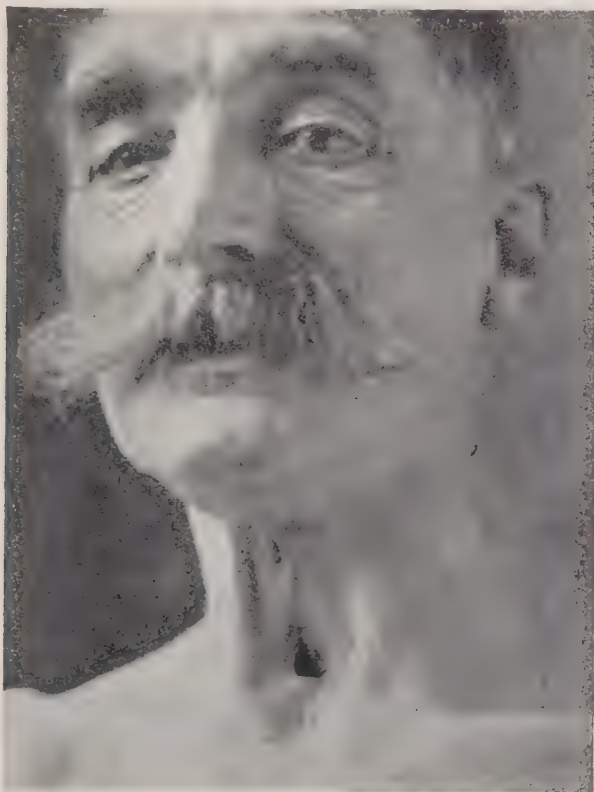


FIG. 67.—Patient after Laryngectomy.

See Fig. 65 for specimen removed. Untouched photograph taken five years after operation. The orifice of the trachea is clearly shown. No recurrence in 1926, thirteen years after operation.

the use of an "artificial larynx" may still further aid the patient in this matter.

Thyrotomy and Laryngectomy Compared.—Thyrotomy has hitherto, particularly in Britain, been more popular than laryngectomy, and in the hands of experts like Butlin, Semon, StClair Thomson and others, has been shown to be a highly successful and reliable operation.

But times have changed. Laryngectomy, formerly an extremely

dangerous operation, is now, if statistics are to be credited, no more dangerous than thyrotomy, and it is impossible to deny that it effects a more radical removal of the disease. From the simple standpoint of the saving of life, therefore, it appears to some authorities to be preferable to thyrotomy in all, even in the earliest cases. In support of their attitude, these authorities point out that the disease is almost always more extensive than is apparent on laryngoscopy, and that the removal of the growth by thyrotomy must frequently be incomplete, seeing that the line of excision passes but a small distance outside of the apparent edge of the cancer.

One insurmountable drawback to laryngectomy remains: it deprives the patient of his voice and of the comfort of normal breathing.

That being so, we are counselled to lay the pros and cons of the situation before the patient and his friends for their decision. On the one hand, we can promise relative safety at the expense of the voice, etc. On the other hand, we can offer the retention of the voice at the price of some increase in the risk of recurrence. (See J. E. Mackenty, 'Journ. of Laryng.', xxxix, p. 67.)

If the decision be left with the surgeon, he must act according to his experience. But if he can be certain that the growth is small and limited in extent, as when only the central part of the edge of a freely moving cord is involved, he will be justified in electing for the slighter operation. If, on the other hand, he feels any doubt as to its extent, laryngectomy is, perhaps, the safer alternative. Some surgeons, in these circumstances, having obtained the patient's consent, open the thyroid cartilage in order to determine the extent of the growth, and allow themselves to be guided by what they find.

We ought to add, that complete laryngectomy performed for a recurrence of the growth after thyrotomy is disappointing. It usually fails to save the patient's life.

Sub-Hyoid Pharyngotomy.—The opening into the pharynx through the thyro-hyoid membrane by a transverse incision below the hyoid bone. (See Fig. 68.)

Indications.—Cancer of the upper orifice of the larynx, of the epiglottis, and in certain forms of cancer of the base of the tongue.

Operation.—Unless the larynx is obstructed by the growth, preliminary tracheotomy may be dispensed with, but the tracheotomy tube facilitates the administration of the anæsthetic.

The skin-incision is transverse, passing at the level of the hyoid bone from the tip of the greater cornu on one side to the corresponding point on the other. The hyoid bone is exposed by deepening the incision, and the depressor muscles are divided near their insertions so as to expose fully the thyro-hyoid membrane. All vessels having been seized, this membrane is now divided from one side to the other, close under the hyoid bone, so as to avoid injury to the superior laryngeal nerve. The underlying mucous membrane of the base of the tongue is now divided and bleeding vessels

secured. This gives access to the pharynx in the glosso-epiglottic fossæ, the epiglottis and the rest of the larynx being in the lower part of the wound, and tumours here can be removed.

To close the wound the mucous membrane is sutured first, then the muscles, and finally the skin. Provision should be made for drainage. The tracheotomy tube may be removed at once unless the operation has involved the larynx and there is any risk of reactionary hæmorrhage or of œdema of the glottis.



FIG. 68.—Sub-hyoid Pharyngotomy (after Kocher).

The after-treatment follows the same lines as that of thyro-fissure. (See p. 155.)

Lower Lateral Pharyngotomy. (Wilfred Trotter).—*Description.*—The opening of the pharynx through a lateral external incision and deep cervical dissection carried down to the hyoid bone and thyroid cartilage, the hyoid cornu and thyroid ala being excised to furnish access to the pharyngeal wall.

Indications.—Cancer in the epiglottic and arytenoid regions ("epi-laryngeal" cancer), and post-cricoid ("hypopharyngeal") cancer. (See also p. 78.)

It is advised that when the disease is situated on one side of the pharynx, the exposure by operation should be made through the opposite side of the neck.

Preparation is the same as for laryngectomy. (See p. 156.)

Anæsthetic.—A preliminary tracheotomy is performed, and the anæsthetic is administered through the tracheotomy tube.

Operation.—The cervical incision runs along the line of the sterno-mastoid from just above the level of the angle of the jaw down to the level of the cricoid or further. The deep cervical fascia is divided from above downwards along a line an inch anterior to the skin incision, in order to provide a flap for subsequent use.

A second skin incision from about the middle of the first, and carried upward and forward towards the point of the chin, is also required.

The cervical dissection of the areas thus demarcated involves the removal of connective tissue, fat and glands from the superior carotid and sub-maxillary regions, in the course of which the sterno-mastoid muscle is wholly or partially removed, and the external carotid artery ligated and divided.

Then the fascial flap described above is folded over the carotid vessels, which have been freely exposed by these manipulations, and stitched to the prevertebral fascia and muscles behind the pharynx. This is done in order to shut off the large blood-vessels from infection by the wound secretions of the subsequently opened pharynx.

The cricoid, thyroid and hyoid are now cleared of their attached muscles—the inferior constrictor, stylo-pharyngeus, hyo-glossus, middle constrictor, etc. The pharyngeal wall is separated underneath from the deep surfaces of hyoid cornu and thyroid ala, and these structures, now completely isolated, are excised, the whole of the greater hyoid cornu and at least two-thirds of the thyroid ala being removed, together with the thyro-hyoid ligament connecting them. The intact pharyngeal wall now lies fully exposed.

Sutures are passed through this wall on either side of what is to be the incision through it, and when sufficient have been inserted, the wall is raised by their means, and a longitudinal incision made through it from above downwards. This manoeuvre is necessary if we are to avoid soiling the neck wound with septic pharyngeal secretions.

The pharyngeal incision exposes the introitus laryngis; the base of the tongue and epiglottis; and below, the laryngo-pharynx.

The mouth and naso-pharynx having been plugged with sponges to hold up mucus from these cavities, the growth is examined, defined, and excised together with a free area of healthy tissue around it. The laryngeal wound thus made is closed with deep sutures, as is the pharyngeal incision.

Finally, the wound area in the neck is obliterated by suitable suturing, provision being made for free drainage, however, by means of large drainage-tubes extending down as far as the pharyngeal incision.

After-treatment.—Feeding is carried on through a nasal tube inserted at the operation, and the tracheotomy tube is left in position for a week.

The after-treatment generally is the same as that for laryngectomy. (See p. 162.)

For laryngotomy, see p. 200.

Palliative Treatment of Cancer of the Larynx.—*X-Rays.*—In inoperable cases treatment by X-rays after the Erlangen method is worthy of trial, particularly since cases are on record in which the radiation did more than

palliate ; it led to a disappearance of the growth. Robert Knox, who has reported such a case, administered rays from a current of from 130,000 to 150,000 volts twice a week for a month, first on one side and then on the other, followed by a fortnightly exposure for several months, and equalling in all an exposure of twenty hours. The rays were suitably filtered and the skin protected.

Considerable laryngeal reaction follows heavy X-ray treatment, and preliminary tracheotomy is necessary. The skin and soft tissues also may be so much injured that if laryngectomy is subsequently performed, the wound will not heal. (O. Strandberg, 'Journ. of Laryng.,' vol. xxxix, p. 437.)

Radium.—W. D. Harmer inserts tubes of radium into the laryngeal growth through a large window in the thyroid cartilage, and reports favourable results.

Diathermy.—The writer has employed diathermy destruction of cancerous growths of the epilarynx, particularly for the relief of pain and mechanical dysphagia, with much temporary benefit.

Tracheotomy is performed for the relief of dyspnœa. It should not be too long delayed, and the low is preferable to the high operation, as it is more remote from the seat of disease.

NEUROSES OF THE LARYNX

Sensory.—**Anæsthesia** may arise from a *peripheral* nerve lesion such as neuritis from diphtheria, in which the superior laryngeal nerve or the vagus trunk, of which the superior laryngeal is a branch, is involved. It may also follow a traumatism of those nerves, as in war-injuries, suicidal attempts, or operation.

In the neurotic type motor laryngeal paralysis is common, and other cranial nerves may be affected.

Of the diseases of the *central* nervous system which produce laryngeal anæsthesia, the commonest are bulbar paralysis, locomotor ataxy, general paralysis of the insane, and hysteria. In these conditions the anæsthesia is almost invariably bilateral.

Symptoms.—In unilateral anæsthesia deglutition is often imperfectly performed, the food tending to enter the larynx, and to set up spasm and choking. Or, if the glottis is completely insensitive, as in bilateral anæsthesia, particles of food find their way into the trachea and set up bronchitis and septic pneumonia.

Anæsthesia of the larynx is frequently combined with anæsthesia of the pharynx, and with motor paralysis of these parts.

The *prognosis* depends upon the cause. The diphtheritic type tends to recovery in about a month or six weeks, provided that the disease is not extensive. (See p. 39.) That due to injury of the superior laryngeal nerve may be permanent. And the bilateral type arising from a central nerve lesion is of serious import from its tendency to end in pneumonia.

Treatment.—Diphtheritic cases are kept in bed. Faradism is employed, and strychnine given hypodermically. (See p. 42.)

If the affection is bilateral and deglutition is impeded, the patient should be fed by a tube passed through the nose into the œsophagus. As the larynx is insensitive, make sure by the laryngoscopic examination that the tube is actually in the œsophagus and not in the larynx before passing any food through it!

Hyperæsthesia and Paræsthesia of the larynx are generally expressed by the patient as a feeling of pain, of tickling, of soreness, of rawness, or of the presence of a foreign body in the larynx.

Singers and voice-users are very prone to suffer from symptoms such as these, or from aching in the throat or neck, and from feelings of tiredness or weakness, especially after singing.

Diagnosis.—Careful examination is needed to eliminate a local cause, such as enlarged faucial or lingual tonsils, or early laryngeal tuberculosis. Sometimes a naso-pharyngeal abnormality will be found to be responsible for the disturbance.

If no local cause is present, search should be made for signs of tabes, seeing that attacks of pain or paræsthesia of the larynx with glottic spasm may really be the laryngeal crisis of tabes dorsalis. Sometimes the paræsthesia is hysterical, resembling the *globus hystericus*.

Treatment consists in removing any local abnormality, but such local treatment should only be adopted when there is some clear indication for it, as these patients, being often neurotic, are liable to become throat hypochondriacs.

If possible, firm reassurance that there is no serious local disease such as cancer or tuberculosis should always be given.

Periodical cocaineizing and cauterizing the pharynx or dabbing the healthy larynx with local applications should not be encouraged.

Motor Neuroses of the Larynx.—**Hyperkinesis**—**Spasm of the Glottis.**—Spasmodic attacks of choking or sensations of choking—*croup*—may arise from irritation of the laryngeal sensory nerves. (See table, p. 7.)

Spasm of the Glottis in Children may be due to a foreign body impacted in the larynx or loose in the trachea: to acute laryngitis, whether diphtheritic or simple (see p. 110); or it may arise from some reflex cause, in which case it is known as—

Laryngismus Stridulus or **Spasmodic Croup**. This malady is commonly found in delicate or ill-nourished infants or young children who are suffering from adenoids. Not infrequently, however, we are unable to determine the actual cause of the attacks, in which case it is inadvisable to take refuge in a diagnosis of “worms,” or “teething.”

Symptoms.—The attack comes on suddenly without premonitory symptoms, and usually during the night. It is frequently very alarming, inasmuch as it induces symptoms of asphyxia, which indeed in very delicate children have been known to end in death, but as a rule they subside

spontaneously in a minute or two. After a period of crowing, cyanosis and struggling, ending sometimes in a short spell of apnoea, normal easy breathing is restored, and the little patient falls asleep again, waking up in the morning either quite well, or with just a croupy cough as a reminder of the ordeal. But the attacks are very liable to recur, and may indeed attend every slight "cold" or catarrh.

Diagnosis.—Spasmodic croup is apyrexial, and it is further distinguished from inflammatory spasm or oedematous obstruction by its evanescent and recurrent characters. The first attack, however, may be difficult to diagnose correctly.

A series of recurrent attacks of glottic spasm within a brief space of time should raise the question of a loose foreign body in the trachea, and the patient should be X-rayed.

The child should also always be examined for adenoids, as laryngismus stridulus is most frequently merely an expression of these growths.

Treatment.—During the attack, the spasm may be at once allayed by applying a sponge wrung out of hot water—not too hot—to the front of the larynx. Rhythmical traction of the tongue is recommended. If the apnoeic period were prolonged, artificial respiration would be called for, and perhaps even intubation or tracheotomy might be necessary. But as a matter of fact, in genuine spasmodic croup in children the attack is at an end before even simple remedies can be applied, and if severer remedies prove to be necessary, the case really belongs to one of the more serious varieties of croup.

The best *preventive* of the attack is the removal of adenoids.

Spasm of the Glottis in Adults may occur without any definite cause, but in most cases a cause will be found if sought for. The spasm may be due to reflex irritation from the pharynx or larynx, as during laryngoscopic examination, or it may result from the inhalation of irritating or asphyxiating gases and vapours as in modern warfare. In these conditions it is, of course, non-recurrent.

As a recurring affection it may arise from irritating or acute maladies of the larynx; from the presence of a foreign body in the larynx; and it is occasionally induced by an elongated uvula or a hypertrophied lingual tonsil.

The early stages of recurrent laryngeal nerve paralyses are sometimes attended with glottic spasm, and so in the diagnosis of such cases the causes of recurrent laryngeal paralysis must be held in mind.

We have already mentioned tabes as a cause of glottic spasm in the laryngeal crisis, and it is occasionally hysterical in origin.

We may include here also the peculiar nervous condition known as *Ictus Laryngis* or *Laryngeal Vertigo*, which consists in a violent attack of coughing followed by glottic spasm and a momentary loss of consciousness—a group of symptoms obviously related to the epileptic *petit mal*.

The *Symptoms* require no special description. In the purely reflex and spasmodic cases the attacks are seldom dangerous to life though

apt to be very alarming, especially if they make their first onset during the night.

The *Diagnosis* involves an exclusion of bilateral abductor (dilator) paralysis (see p. 173), and necessitates a consideration of the causes we have just synopsized.

The *Prognosis* depends upon the cause.

Treatment.—Control of the larynx may sometimes be regained by deliberate, slow breathing, or simply by phonating. But in the severe and prolonged attacks chloroform may be necessary to subdue the irritation, and the need for tracheotomy may arise.

STAMMERING AND STUTTERING

though not strictly a laryngeal neurosis may be conveniently discussed here.

Stammering seems to be due to an imperfect co-ordination of the muscles which operate the mechanism of speech, respiratory, laryngeal and oral. The first supply the current of air which, acting along with the adductors and tensors of the larynx that bring the cords into apposition, produces the sound, while the modification of the sound by the muscles of the pharynx, soft palate, tongue and lips form vowel-sounds and consonants, syllables, words and sentences.

Any irregularity in the timing of these normally associated movements will result in hesitation, and so in stammering.

It must be added that this is not by any means the only theoretical explanation of the defect. It has been variously described as a lack of appreciation of consonants, especially initial consonants such as p or t, and on the other hand, as a lack of the kinæsthetic sensation of vowel-sounds. ("Kinæsthetic"; *i. e.* sensation of movement.)

Whatever the analysis of the defect may ultimately prove it to be, the writer has no doubt that it represents an imperfect development of the faculty of speech, or, when it follows apoplexy or an aphasic attack, a stage in the disintegration of that faculty. The former is often hereditary.

Stammering is also common during recovery from the aphasia of shell-shock, and in this variety also it may become a permanent habit.

Varieties.—In addition to the common types of stammering over an initial consonant, we have the *silent stammer*, where the patient, although obviously labouring under stress, is aphasic for a few moments instead of stammering. Another more common variety is the interpolation of "ha" or "er" before the obstructing word or syllable.

Symptoms. Stammering usually appears in childhood as the child is learning to talk, and once it is established, it tends to remain as a life-habit in spite of all efforts at cure. The stammer affects some words and syllables more than others, the most difficult being the explosive consonants, such as p and b, t and d. Stammerers, knowing their most difficult words in

conversation, learn to employ periphrases in order to avoid encountering those obstacles.

The stammer is usually worse in company, especially in strange company, or when the patient is nervous or excited, and such patients are usually men (it is commoner in the male sex) of decidedly unstable nervous constitution. It is interesting that when the patient is alone and when he is singing or reciting, the stammer is absent.

Prognosis.—Treatment may modify the habit, but it is seldom entirely curable.

Treatment.—As soon as a child is known to stammer, efforts should be made by parents and the teachers to instruct the child to practise slow speaking, and, especially, not to begin each uttered phrase or sentence until a comfortable, deep breath has been taken.

There are many “systems” in vogue for improving the established stammer, the favourite being to drop out the letter which is most troublesome; thus, if “t” is difficult, the word “talk” is pronounced “alk” and so on. And a certain amount of improvement follows the use of such devices. The best results will be obtained when treatment is adopted early in life.

LARYNGEAL PARALYSIS

The whole of the intrinsic motor mechanism of the larynx is controlled through the inferior or recurrent laryngeal nerve, a branch of the vagus, with the single exception of the crico-thyroid muscle, which is supplied by the superior laryngeal nerve—the sensory nerve of the larynx.

Speaking generally, the lesion producing laryngeal paralysis may be situated—

1. In the cerebral cortex or internal capsule. (Cortical laryngeal paralysis is nearly always hysterical, and it is always bilateral.)
2. In the medulla oblongata, in the neighbourhood of the vago-accessory nuclei. Or it may arise—
3. From intracranial pressure by tumour and syphilitic or other meningeal inflammation on the vagus trunk in its way to the jugular foramen, its route of exit from the cranium; or from pressure on the vagus or its laryngeal branches in the neck or thorax, as by goitre, simple and exophthalmic, thoracic aneurysm, cancer of the post-cricoid region and œsophagus, mediastinal new growths, etc.
4. From peripheral neuritis of the vagus or its branches.
5. From pressure on the nerve-endings in the muscles of the larynx in laryngeal inflammations and infiltrations—the myopathic paralysis.

The diagnosis of the different varieties of laryngeal paralysis can be made from the laryngoscopic appearances, but the diagnosis of their cause is a much less simple task.

Paralysis of the (Crico-Thyroid) Muscle supplied by the Superior Laryngeal Nerve.—This is a rare form of paralysis, and when it does occur it is generally associated with anæsthesia of the larynx. (See p. 167.) The normal contraction of the crico-thyroid muscle draws down the thyroid cartilage over the cricoid, stretching the vocal cord and rendering it tense. When the muscle is paralysed the corresponding cord presents a wavy outline, and the voice is weakened, especially if the paralysis is bilateral.

The prognosis naturally depends upon the cause of the paralysis. When bilateral and combined with complete laryngeal anæsthesia, there is danger, the cough-reflex being abolished, of food passing into the bronchi and setting up septic pneumonia.

Paralysis of the Muscles supplied by the Recurrent Laryngeal Nerve ("Recurrent" Paralysis).—When the recurrent laryngeal, the motor nerve of the larynx, undergoes gradual destruction in consequence of disease or pressure-atrophy of its fibres, the muscles under its control are paralysed, not haphazard or simultaneously, but in groups, according to their function. First, the abductors (or dilators) are affected; next the internal tensors; and lastly the adductors (or constrictors). As the abductors of the cord (or laryngeal dilators) suffer first, their action is abolished while yet the other groups are fulfilling their normal function. That being so, the adduction of the cords by their adductors and the resulting phonation is not interfered with in early recurrent paralysis, and thus when the paralysis is *unilateral*, the affected cord being retained by its active adductors in the middle line while the other cord can move normally, the patient will be able both to speak and to respire, and so no symptoms whatever will exist to direct his attention to the larynx.

Thus, the first stage of *unilateral recurrent paralysis* either escapes notice, or is discovered accidentally.

Bilateral recurrent paralysis, however, even at its earliest stages does attract attention, not, at this period, because of any interference with the voice, but because of the impediment to respiration produced by the vocal cords, which, by reason of the unopposed action of their adductors (constrictors of the larynx), come to lie near the middle line, and more or less in contact with each other. The glottis being thus closed, dyspnœa results, and asphyxia, and even death may occur as a consequence.

After the abductors (or dilators), the group of muscles next to be immobilized by the advancing destruction of the recurrent laryngeal nerve-fibres is that of the internal tensors. Finally, the adductors of the cord (constrictors of the larynx) undergo paralysis, and with their involvement, recurrent laryngeal paralysis becomes complete.

(The above description applies to laryngeal paralysis due to *organic* lesions of the motor nerves. On the other hand, it is found that if the adductors (constrictors) or tensors are affected, while the abductors (or dilators) are moving normally, then the paresis or paralysis is *functional*

(hysterical) or *myopathic*, and not due to an organic lesion of the nerve. (See later, p. 178.)

We proceed now to discuss paralysis of the several muscle groups in detail, and then we shall go on to describe the laryngeal appearances in total recurrent laryngeal paralysis.

The first stage of recurrent paralysis is **Abductor (Dilator) Paralysis**.—(The abductor of the vocal cord is the crico-arytenoideus posticus.*) This is commonly produced by pressure on the recurrent laryngeal nerve or nerves by tumours, aneurysm, goitre, enlarged mediastinal glands, or by malignant disease of the œsophagus. A central nerve lesion in the medulla or of the vagus at the base of the brain, such as may occur in tabes, bulbar paralysis, disseminated sclerosis, or intracranial syphilitic disease, may be responsible for the paralysis, or it may arise from herpes or from neuritis of toxic or influenzal origin. (The jugular syndrome, see p. 90.)

Among the rarer causes we may mention enlarged tuberculous or cancerous intrathoracic glands, as, *e. g.*, from cancer of the breast (A. Logan Turner); pleuritic adhesions about the apex of the right lung, implicating the right recurrent laryngeal nerve; thyroidectomy; and dilatation of the heart. (Mitral stenosis with enlargement of the left auricle may cause left recurrent paralysis by squeezing the nerve between the left pulmonary artery and the aorta or aortic ligament.—G. E. Price, 'Journ. of Laryng.,' xl, p. 140.)

In a certain proportion of the cases seen, no cause can be found for the paralysis.

As a rule, abductor paralysis is unilateral, and is due to some lesion exercising pressure on the trunk of the recurrent laryngeal in its course from the thorax to its termination in the larynx.

As we have already seen, in *unilateral abductor paralysis* the cord takes up a position in the middle line from the unopposed action of the adductors. Thus phonation is not affected, and the discovery of the phenomenon is, as a rule, accidental.

When the *abductors of both cords are paralysed*, the cause is to be found either in large thoracic tumours commanding both recurrent laryngeal nerves, in some central lesion, or in some condition, toxic or otherwise, which tends to produce symmetrical disturbances.

In bilateral abductor (dilator) paralysis, as we have said, both of the cords occupy a median position, lying more or less in contact. There is no hoarseness, but there is dyspnoea, and, frequently, loud stridulous breathing (laryngeal stridor). As the tensors and finally the adductors (constrictors) become paralysed the dyspnoea and stridor tend in due course to disappear, but, to begin with, the interference with respiration may be so great as to necessitate tracheotomy, and the wearing of a tracheotomy tube for a time. Sometimes, indeed, bilateral abductor paralysis does not

* Hence the name sometimes given of "posticus" paralysis:—The atrophy of the paralysed "posticus" muscle is well exhibited in the Frontispiece.

pass into complete recurrent paralysis, and then the necessity of wearing a tracheotomy tube may continue indefinitely.

It is characteristic of these cases that if the paralysis is of very gradual onset, the patient becomes so accustomed to the impediment that he himself may be able to ignore, or indeed may be actually unaware of any dyspnoea or difficulty in breathing. And an amount of obstruction which if suddenly produced would cause asphyxia and perhaps death is tolerated with scarcely any resentment. The only difficulty experienced is on exertion, or during an attack of laryngitis or bronchitis.

Nevertheless, the danger, though ill-appreciated, is real enough, for a slight increase in the obstruction, as from an acute laryngitis, is sufficient to tilt the balance and to lead to rapid death.

For that reason, immediate tracheotomy should be urged upon the patient, but, as a matter of fact, unless he has had actual experience of a real dyspnoëic attack, he will be hard to convince of the necessity for the operation.

Operative Treatment of Bilateral Abductor Paralysis.—Many efforts have been made to remove the obstruction to the breathing produced by permanently adducted cords, but so far without much success. The removal of one or both cords by cutting punch-forceps, under suspension or through the direct tube, is perhaps the most usual of these, as it is the most obvious plan to adopt. But the operation is followed by the formation of granulations and scar-tissue and the recurrence of the obstruction. Another suggestion (Irwin Moore) consists in the displacement of the cords outward and their fixation in transverse slits made in the thyroid cartilage. But this also has proved to be a failure. (Woodman.) A third plan, adopted by Chevalier Jackson, of the ablation of the cords together with the soft parts lining the larynx and including the subglottic tissue, however, is reported to have been more successful. All these methods are still on trial. (See 'Proc. Roy. Soc. Med.,' Laryng. Sect., xvi, p. 32.)

Paralysis of the Internal Tensors.—(The internal tensors of the vocal cord are the thyro-arytenoideus internus and externus, which are supplied by the recurrent laryngeal nerve. The external tensors are the crico-thyroidei supplied by the superior laryngeal nerve; see *ante*, p. 172.)

When internal tensor paralysis occurs in association with abductor (dilator) paralysis *in the second stage of recurrent paralysis*, the cord still occupies the median position, but the voice is weak as the approximation of the cords is imperfect.

Complete paralysis limited to internal tensors alone and due to a nerve lesion is very rare. When it does occur, it is said that abduction (dilation) occurs as in health; but on attempting phonation, the cords only come together along their posterior third (from the unaided action of the adductors), and fail to meet in their anterior two-thirds.

Bilateral paresis or paralysis of the internal tensors is most commonly functional, due either to hysteria or to myopathy, as in chronic laryngitis.

Adductor (Constrictor) Paralysis.—(The adductors of the vocal cords

are the crico-arytenoidei laterales, which, by rotating the arytenoid cartilages, bring their inner angles, bearing the cords, together: In this they are aided by the arytenoideus muscle which approximates the arytenoid cartilages as a whole, and also by the thyro-arytenoidei externi.)

When, in the advancing destruction of the fibres of the recurrent laryngeal nerve, the complete interruption of its conductivity is reached, paralysis of the adductors of the cord is added to the existing paralyses of the abductors and the internal tensors, and we have now to deal with *complete recurrent paralysis*, or, as it is generally termed, "paralysis of the vocal cord."

This gradual extension of paralysis from one group of muscles to another is only seen when the conductivity of the nerve is being slowly and progressively interrupted, as when it is stretched and atrophied by an enlarging thoracic aneurysm or mediastinal tumour. When the nerve is suddenly and completely destroyed, as by a bullet wound, or by a surgeon's

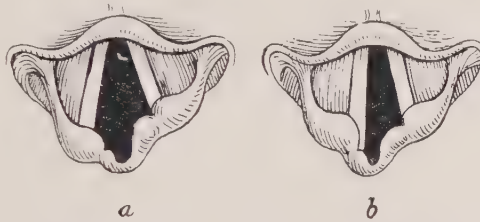


FIG. 69.—Recurrent Laryngeal Paralysis (Fixation of the Left Vocal Cord)—(a) during quiet respiration; (b) during attempted phonation. The usual over-adduction of the sound cord on phonation is not shown in this diagram.

manipulations, in a goitre operation for example, total recurrent paralysis is produced instantaneously.

In **total recurrent paralysis of one cord**, the cord assumes the cadaveric position, and is quite immobile. During phonation, the sound cord of the other side crosses the middle line in an effort to come into contact with the paralysed one, the arytenoid eminence of which may be seen during this movement to be pushed aside and behind by the healthy over-adducted arytenoid. In this way a certain amount of vocal tone is produced, and as time passes, the voice may gain in power and volume to such an extent that the patient may actually be able to speak in public. During quiet inspiration, the larynx appears normal. During deep inspiration, the sound cord alone is fully abducted, while the paralysed cord remains motionless in the position of partial abduction. (See Fig. 69 and Plate I.—Frontispiece.)

It is sometimes difficult to determine whether a cord moves or not, and thus paralysis is not infrequently overlooked.

To sum up what we have been saying :

In the *first stage* of recurrent paralysis, the abductors (dilators) alone are paralysed, and the adductors (constrictors), being unopposed, the cord

is fixed in the middle line. The voice is unaffected. But if the paralysis is bilateral, there is stridor and dyspnœa.

In the second stage, paralysis of the internal tensors is added to paralysis of the abductors. The cord lies close to the middle line, but its approximation to the other in phonation is imperfect. The voice is weak.

In the third and final stage, paralysis of the adductors (constrictors) is added to paralysis of the abductors (dilators) and of the internal tensors. The cord lies motionless in the cadaveric position. There is hoarseness and imperfect cough.

The *course of the recurrent laryngeal nerve* must be considered in connection with laryngeal paralysis, as the great liability of that nerve to pressure from tumours, etc., renders such a lesion the most common cause of these paralyses.

The nerve runs a somewhat different course on the right from what it does on the left side. Both are branches of the vagus. On the right side the nerve arises in the lower part of the neck. Coming off from the vagus as that nerve passes down in front of the first part of the subclavian artery, the right recurrent laryngeal loops below and ascends behind the subclavian artery; it then passes upwards and inwards behind the common carotid and inferior thyroid arteries to gain the angle between the œsophagus and trachea, where it continues its ascent until it enters the larynx beneath the edge of the inferior constrictor muscle. The nerve of the left side arises in the thorax from the vagus as it lies in front of the arch of the aorta. It arches round below and then up behind the aorta, ascending into the neck behind the left subclavian artery. Having gained a position between the œsophagus and trachea, it passes up to enter the larynx under the lower edge of the inferior constrictor muscle. It does not run so close to the œsophagus as its neighbour of the right side. (See Frontispiece.)

As a result of this difference in position, the left recurrent laryngeal is more liable to pressure in aortic aneurysm and thoracic tumours generally, while the right recurrent is more frequently involved than the left in malignant disease of the œsophagus.

Diagnosis.—The differential diagnosis between a vocal cord fixed by ankylosis of the crico-arytenoid articulation and a paralysed cord has already been discussed. (p. 123.)

In the diagnosis of the cause of paralysis of the vocal cord in any particular case it is necessary to examine the neck for goitres or other tumours, the laryngo-pharynx and œsophagus for cancer, and the chest for aneurysm or mediastinal tumour, in a search for which X-ray examination is indispensable.

As a result of the recurrent paralysis, generally unilateral and left-sided, the laryngeal symptoms of *aneurysm of the thoracic aorta* are: (1) cough, (2) paroxysmal dyspnœa, and (3) alteration in the voice. The cough is the well-known "brassy," "bovine," or incomplete cough produced by the partial closure of the glottis in coughing efforts; the paroxysmal dyspnœa

is due to attacks of glottic spasm ; and the hoarse voice to the immobility of the cord. " Tracheal tugging " may also be felt. It is elicited by getting the patient to extend the head fully so as to render the trachea prominent in the neck, and to put it on the stretch. In this position, communicated pulsation from an aortic aneurysm is readily detected by placing the thumb and one finger on the pomum Adami, and pressing it slightly upwards.

Recurrent Paralysis following Thyroidectomy.—Partial thyroidectomy for goitre may be followed by laryngeal paralysis even when the nerve has not been divided. It is supposed that in the course of the manipulations the nerve is dragged upon and stretched round the inferior cornu of the thyroid cartilage. As a rule the consequence is complete recurrent paralysis, but the writer has recorded a case of permanent bilateral abductor paralysis resulting therefrom. ('Proc. Roy. Soc. Med.,' Laryng. Sect., December 3rd, 1920.) Such sectional paralysis is apparently due to the fact that the nerve may break up into its branches before entering the larynx, some of which are injured while the others escape. (W. G. Howarth, 'Brit. Med. Journ.,' March 15th, 1924, p. 465.)

Bilateral Recurrent Paralysis (Total Laryngoplegia) is extremely rare. In this type, both cords are affected ; they lie fixed in the cadaveric position, and do not meet under any circumstances. The patient is voiceless, and even the whisper can no longer be produced.

It is a curious fact that during deep inspiration, the paralysed cords may be seen to approach each other.

Prognosis of Recurrent Paralysis.—The outlook naturally depends upon the cause of the paralysis. Those forms which are due to neuritis often end in recovery, but those due to pressure on the nerve-trunk are usually permanent.

The prognosis, as regards vocal power in unilateral paralysis, is, as we have already seen, more favourable than might be expected. But as a rule, the patient remains permanently aware of some weakness in the voice.

Treatment.—The treatment must be applied to the cause. If that can be successfully overcome, the recurrent paralysis will disappear unless the damage to the nerve-trunk is irreparable.

Of recent times nerve anastomosis has been undertaken for the restitution of motor control through the recurrent nerve. Experimental work has been done by Sir C. Ballance and L. Colledge, and C. H. Frazier has anastomosed the recurrent, paralysed after thyroidectomy, with the descendens noni, and reports improvement in the movement of the cord. ('Annals of Surgery,' February, 1924.)

Paralysis of the Arytenoideus Muscle alone is not uncommon. It is usually either hysterical or myopathic.

On phonation the cords come together along their anterior two-thirds,

but a triangular chink is left between the vocal processes (contrast with paralysis of the internal tensors).

The *treatment* is applied to the cause.

Bilateral Adductor Paralysis (Functional Aphonia, Hysterical Aphonia).—Bilateral paralysis of the adductors of the cord, the abductors being active, is never due to recurrent paralysis. It is either myopathic from laryngitis, or hysterical in origin.

The *myopathic type* is easily diagnosed on examination. The cords being red and thickened, when efforts at phonation are made, they come into contact in front and behind, but leave an elliptical opening between them through which the air rushes, producing a sound that is little more than a whisper.

It is, perhaps, scarcely accurate to speak of this condition as a paralysis or even as a paresis, since it is obviously due to the infiltration mechanically impeding the contraction of the muscular fibres of the cord.

The *treatment* is that of chronic laryngitis. (See p. 120.)

Functional or Hysterical Aphonia is most commonly found in young women, but the Great War has made us acquainted with the same condition in an extremely obstinate form in men who have been exposed to shell-explosion or to other forms of severe shock.

The only symptom, apart from the stigmata of hysteria, is voicelessness, usually of quite sudden onset. In civil life it is predisposed to by local conditions, such as chronic laryngitis, and by constitutional asthenia as from anæmia, incipient phthisis, neurasthenia or boredom. Its occurrence is frequently determined by some kind of shock or fright, and a shock or fright may also lead to its cure.

It is possible often before examining the patient's larynx to hear a certain amount of phonation when the patient is made to cough. But in the most extreme cases the patient is also unable to cough, and even a whisper is beyond his powers. (Apsitheiria.)

On laryngoscopic examination, the larynx, unless it is the seat of laryngitis, appears to be quite healthy in colour and form. The vocal cords move with respiration, but on asking the patient to phonate, the observer will mark that although they approximate, they fail to close, and only a noisy breath-sound is produced. At this moment, if the patient is made to give a gentle cough, the cords will be seen to come together to do so, thus clinching the diagnosis.

As we have already indicated, however, in shell-shock cases even the effort at coughing may be feeble and imperfect.

Diagnosis.—The possibility of early phthisis must not be forgotten.

Prognosis.—The voice will be restored again, either by treatment or spontaneously. But the aphonia may last for months and even for years. It is, moreover, a hysterical phenomenon, and on its disappearance some other hysterical paralysis may take its place. Recurrence also is common.

Treatment.—In first attacks one is often able to bring the voice back by moral suasion and the suggestive influences of the laryngeal mirror and examination. If we fail to do so at the first attempt, some other method should be tried, without any loss of hopeful confidence being made manifest.

The faradic current, fairly strong, applied to the neck or with one electrode in the larynx, is a very effective shock treatment. But it is painful and frightening, and is, moreover, open to the drawback that if it fails the malady seems to become more firmly rooted than ever. It is contra-indicated in shell-shock, sufferers from which are almost invariably made worse on exposure to violent and sudden stimuli.

For this class of patient the administration of ether, as if for operation, combined with suggestion before and during the induction period, as well as when the patient is emerging from the anæsthetic, is frequently successful in restoring the voice.

Hypnotic suggestion also is sometimes of benefit (Burnett Rae), and especially the suggestion, apart from hypnotism, that emanates from a confident and persuasive personality. (H. Smurthwaite.)

There are, nevertheless, some cases which resist all methods, or where the success obtained is merely temporary. For such cases, tonics and good food to increase the bodily vigour should be given, and then the moral methods may be tried again with more chance of success.

The following table indicates roughly the causes of **Fixation of the Vocal Cord** :

1. *Disease or Ankylosis of Crico-Arytenoid Articulation* :
 - (a) Rheumatic.
 - (b) Syphilitic.
 - (c) Tubercular.
 - (d) Carcinomatous.
2. *Perichondritis* :
 - (a) Traumatic.
 - (b) Syphilitic.
 - (c) Tubercular.
 - (d) Carcinomatous.
3. *Cicatricial Adhesions* :
 - (a) Septic.
 - (b) Syphilitic.
 - (c) Traumatic.
4. *Paralysis of Cord.*
5. *Contusion or Fracture of Thyroid Cartilage.*

LARYNGEAL STENOSIS

The following table is a synopsis of the diseases of the larynx which cause narrowing of the lumen and obstruction to the air-passage.

The reader is referred for details to the section dealing with each item :—

I. *Intralaryngeal Causes* :

1. Swelling of soft parts from—
 - (a) Acute laryngitis or perichondritis.
 - (b) Œdema, acute or chronic.
 - (c) Tubercular, lupoid or gummatous deposits.
 - (d) Neoplasms, simple or malignant.
2. False membranes, septic or diphtheritic.
3. Laryngismus stridulus, and spasm of the glottis.
4. Congenital laryngeal stridor.
5. Congenital web of the larynx, cicatricial adhesions and bands from traumatism, gunshot wounds, high tracheotomy, intubation.
6. Ankylosis of the crico-arytenoid articulation.
7. Bilateral abductor (dilator) paralysis of the cords.
8. Foreign bodies in the larynx.

II. *Extralaryngeal Causes* (rare) :

Large foreign bodies in the œsophagus.

Symptoms.—In *Laryngeal Stenosis* there is stridor attending inspiration chiefly or exclusively. In *Tracheal Stenosis* the stridor is both inspiratory and expiratory. The loudness and quality of the adventitious sound vary with the nature and the degree of obstruction, and the same factors influence the symptom of dyspnœa. In this matter, also, the nature of the onset is of importance. Obstruction arising suddenly is badly borne, and tends to give rise to alarming symptoms, whereas the same amount of obstruction of gradual onset is tolerated without difficulty; and dyspnœa may only be noticed when the patient is making exertion, or during sleep.

The attitude instinctively adopted by the patient as being the least oppressive in laryngeal stenosis differs from that adopted in tracheal stenosis.

In laryngeal cases the head is thrown back; in tracheal cases it is held forward with the chin depressed so as to relax the trachea. The voice, in laryngeal cases, save in bilateral abductor paralysis, is rough and hoarse. In uncomplicated tracheal stenosis, on the other hand, the voice is clear, though weak, or it may, as in goitre, assume a “reedy” or bleating quality.

The prognosis and treatment of laryngeal stenosis depends upon the cause, and may be sought for in the sections dealing therewith. At present, we shall allude only to the treatment of cicatricial stenosis.

Cicatricial Laryngeal Stenosis is the result of old syphilitic disease, of gunshot injuries, or of high tracheotomy. A congenital web of the larynx extending between the cords and occupying the interval of the anterior commissure is occasionally met with.

We have already considered the subjects of the congenital web (p. 109), and syphilitic scarring and contraction (p. 125).

Bullets passing through the larynx from side to side induce a wound which, if the patient survive, is apt to cause serious and permanent cicatricial stenosis, necessitating the continuous wearing of a tracheotomy tube.

On examination, the upper surface of the mass of scar-tissue may look as if it were only a thin web, but the appearance is deceitful; and any attempt to open up the obstructed lumen by a simple intralaryngeal incision will fail.

The commonest type of cicatricial stenosis in civil life is that due to an unduly high tracheotomy, albeit it is less common than it used to be when tracheotomy was more frequently performed than it is to-day.

In the haste and excitement of urgent tracheotomy on an infant or young child, the operator, particularly if he is working with a poor light and without skilled assistance, has seldom time or inclination to trouble about such refinements as the exact level of the opening he is making into the trachea. Consequently, it is occasionally found after an operation otherwise quite successful that although the disease is completely recovered from, it is impossible to remove the tube, because the child becomes asphyxiated each time the attempt is made to do so, through his being still unable to breathe through the larynx.

The cause of this inability lies in the fact that the tracheotomy opening is situated too near to the larynx, and the irritation of the tube on the thick submucous tissue of the larynx sets up an inflammatory oedema, with, later, granulation-tissue formation which finally becomes scar-tissue, occupying the greater part of the lumen of the air-way. Moreover, if the patient is a child, and nothing is done to remedy the trouble, the larynx will fail to develop, and will remain undersized and infantile in later life.

If at the tracheotomy care be taken not to carry the incision in the trachea any higher than the lower border of the cricoid cartilage, this *contretemps* will never arise. It is, as a matter of fact, generally due to an omission to extend the head sufficiently while performing the operation. (See Tracheotomy, p. 192.)

Treatment.—The performance of a low tracheotomy is the first step, and in recent cases the only step necessary. No further treatment is required, as the laryngeal obstruction will disappear spontaneously.

In old cases, after a low tracheotomy has been performed, the larynx may be dilated by means of Schrötter's bougies, or by the wearing for prolonged periods of graduated vulcanite intubation tubes. If these plans fail, laryngostomy—the re-formation of the laryngeal lumen—may be carried out. But this operation and its after-treatment are extremely tedious, and the results do not seem to be particularly good.

The writer has tried the application of a skin-graft to the larynx, denuded of its scar-tissue, the graft being held in place by the dentist's material known as "stent." But the attempt was a failure.

For traumatic cicatricial stenosis of the larynx it suffices generally to divide the scar-tissue intra-laryngeally, and to maintain the passage thus made by periodical dilatation.

The chances are favourable unless portions of the cartilaginous framework of the larynx have been lost.

Foreign Bodies in the Larynx, if large enough to block the airway, will naturally cause immediate death from asphyxia if not promptly removed. The symptoms are those of asphyxia with violent efforts at respiration. At such a moment, treatment must be speedy. The finger should be passed into the larynx, and the foreign body hooked out.



FIG. 70.—Rabbit-bone (actual size) removed from the larynx of a child two years of age by means of suspension laryngoscopy. It had lain impacted in the larynx for three months.

If attempts at removal fail, laryngotomy or tracheotomy should at once be performed, with a penknife if there is nothing better to hand. (See p. 190.)

Bodies too small to cause asphyxia may if sharp or pointed, be arrested in the larynx, in which case they cause spasm, stridor and aphonia. The spasm may be violent enough to cause death, but impaction between the cords may actually prevent their spasmodic closure, and so maintain the airway. After a time the spasm subsides, and the larynx comes to tolerate the presence of the foreign body, so that it has been known to remain *in situ* for months, as in a case in a young child recorded by the writer. (Fig. 70.)

Treatment.—Tracheotomy first of all having been performed, the foreign body is removed in children by suspension laryngoscopy; in adults by direct laryngoscopy.

CHAPTER VI

THE EXAMINATION AND AFFECTIONS OF THE TRACHEA, THYROID BODY, AND ŒSOPHAGUS

THE TRACHEA

The Examination of the Trachea.—The course of the trachea in the neck can usually be made out by external examination. Even in cases of difficulty where the neck is short and fat, for example, as in children, palpation can almost always be relied upon for correct information. The most difficult cases are those in which the trachea has been buried beneath a large goitre involving the isthmus of the thyroid, or beneath the diffuse brawny swelling of extensive cervical cellulitis.

The laryngoscope frequently affords us information concerning the shape and disposition of the trachea, which in favourable cases may be visible in the mirror as far as the division into the right and left bronchus. By making the patient stand up while the surgeon sits and practises laryngoscopy, it is possible to inspect the trachea as far as the carina.

Tracheoscopy and Bronchoscopy.—The tubes used for the direct examination of the trachea and bronchi are telescopic, and they are longer and finer than the laryngeal tube spatula. (See Fig. 71.) In length they vary from 35 cm. to 15 cm.; and in diameter from 14 mm. to 4 mm., to suit different ages.

In adults, local anæsthesia (see p. 104) is sufficient, but in children most operators will find a general anæsthetic to be necessary, although Chevalier Jackson is able successfully to dispense with it.

Position.—The patient, if an adult, is seated in the ordinary examining chair; on a low stool; or (always in children under an anæsthetic, and sometimes in adults) is laid flat on a table with the head level and turned a little towards the examiner, or with the head extended over the end, in which case the surgeon seats himself at the head of the table.

A useful position is Mouret's, with the patient sitting stride-legs over a chair facing the back of it, the pelvis being pushed well back, and the chest resting against the back of the chair.

Method.—If there is severe dyspnoea, a tracheotomy should be performed before attempting to pass the bronchoscope. In that case it may be inserted through the tracheotomy opening (lower bronchoscopy). Otherwise, the tube is passed through the mouth and larynx. (Fig. 71.)

The first steps are the same as for direct laryngoscopy. (See p. 97.) After the tube has passed the epiglottis and is turned down into the larynx, at which moment the proximal end will occupy a position at one or other angle of the mouth, by gentle pressure, and under inspection, the distal end of the tube is borne through the glottis between the vocal cords, and so onward down the trachea to the bifurcation, which is easily recognized. To enter either main bronchus, the tube is diverted slightly to the one or other side, the handle meantime moving to the side of the patient's mouth opposite to the bronchus which we desire to enter.

The bronchi may be painted with cocaine-adrenalin solution. (See p. 104.)

Passing on in this way we inspect the lumen and walls of the trachea and main bronchi, and are able to penetrate as far as to the bronchi of the second and third degree.

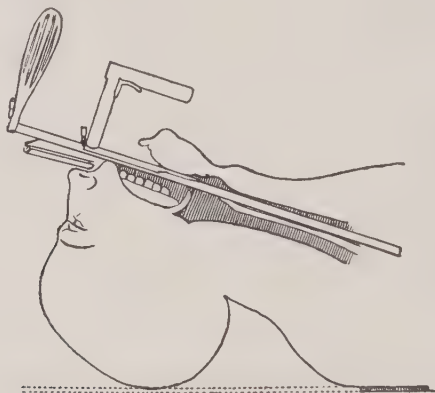


FIG. 71.—Bronchoscopy. The passage of the bronchoscope through the direct laryngeal tube. (Chevalier Jackson.)

Difficulties and Dangers.—The passage of the bronchoscope on an adult by skilled hands, working with skilled assistants, is not difficult or dangerous in itself. The difficulty and dangers lie in the circumstances which call for the operation, such as the presence in trachea or bronchus of a foreign body.

In infancy and childhood, however, upper bronchoscopy must be rapidly, though not forcibly performed, as the presence of the tube in the larynx for longer than fifteen minutes will be followed by laryngeal œdema necessitating tracheotomy, and for the same reason, on infants and children one uses the finest possible tubes.

Bronchoscopy is performed for the removal of foreign bodies (see p. 207), and, more rarely, for the removal of tracheal neoplasms. Asthma has been treated by direct application of remedies to the bronchi through the bronchoscope.

DISEASES OF THE TRACHEA

Displacements.—The trachea may be deviated to one or other side by tumours such as unilateral enlargement of the thyroid, or by inflammatory

swelling in the neck. Such deviations can quite frequently be made out on examination with the laryngeal mirror.

Tracheal Stenosis is caused by :

I. *Intratracheal Causes :*

1. Gummatous infiltration.
2. Syphilitic cicatrices.
3. Swelling of the mucosa from irritating vapours, etc.
4. Stricture following tracheotomy.
5. Neoplasms.
6. Foreign bodies in the trachea.

II. *Extratracheal Causes :*

1. Enlargement and tumours of thyroid gland.
2. Traumatism (wounds, fractures).
3. Cervical cellulitis.
4. Aneurysm (aortic or innominate).
5. Enlargement and tumours of the thymus.
6. Growths and foreign bodies in the œsophagus.
7. Tuberculous bone abscess from vertebræ, sternum, etc.

Tracheitis.—Acute catarrhal inflammation of the trachea is frequent in epidemic catarrh. It presents no distinctive symptoms, although it is sometimes credited with being responsible for a hard, irritating cough. The treatment is that of acute laryngitis. (See p. 111.)

Tuberculosis of the trachea is rare, and when it occurs it is usually as a late phenomenon in advanced pulmonary phthisis. A case has been recorded, however, in which a typical tuberculous ulcer of the anterior wall was discovered in an early case.

Crust Formation in the Trachea is a rare and peculiar disease. It is characterized by the formation of tough, greenish-yellow flakes which dry to crusts, sometimes of considerable size, which the patient only gets rid of after prolonged and violent coughing efforts. Considerable impediment to breathing is caused and death from asphyxia may occur.

Although it may be associated with ozænatous rhinitis, the disease frequently affects the trachea only. Its cause is unknown.

Treatment.—Large doses of potass. iodid. may liquefy the crusts and facilitate their expulsion.

Gummatous Infiltration of the trachea leads to constriction, and is dangerous to life if its formation is not checked, or if it is situated in the thorax.

The nature of the infiltration may be surmised by the presence of syphilitic signs elsewhere, or by the Wassermann reaction being positive.

Treatment by one of the salvarsan group should be at once undertaken,

and mercury given intra-muscularly. The patient should be kept in bed. Healing is sometimes followed by cicatricial stenosis.

Neoplasms in the trachea are not common, but since the introduction of direct examination, their recognition and treatment during life have become more frequent.

Benign tumours are very rare. Several instances of *papilloma* have been recorded. They present the same appearances and manifest the same characteristics as laryngeal papillomata, with which they may be associated. H. Tilley removed successfully a papillary *granuloma*, attached to the tracheal wall, close to the right bronchus in an Army officer who had been exposed fifteen months previously to mustard gas. It was reddish-grey in colour, the size of a small cherry, and almost occluded the lumen. ('Journ. of Laryng.,' vol. xxxv, p. 1.)

Most tracheal tumours are *malignant*, and of these columnar-celled epithelioma, sarcoma and endothelioma have been encountered. Their infrequency is shown by W. S. Syme ('Journ. of Laryng.,' vol. xxxix, p. 305), who finds that their ratio to cancer of the larynx is only 1-30.

There is a tendency for malignant growths in tissues adjoining the trachea, such as the thyroid, to penetrate the tracheal wall, and to give a false appearance of genuine intra-tracheal neoplasm, and error is facilitated by the fact that the intra-tracheal extension is frequently the first indication given of the extra-tracheal neoplasm. The microscopic appearances of the intra-tracheal tumour after its removal usually inform us, however, of its true nature and origin.

Symptoms.—Progressive difficulty in breathing is the first complaint, and is liable to be mistaken for asthma. Later, the dyspnoea, which is aggravated by exertion, is accompanied by tracheal stridor with recession of the episternal notch, and, if severe, also of the intercostal spaces. Persistent cough with paroxysmal exacerbations is common, in the course of which pieces of the tumour may be expectorated. Hæmoptysis, also, is so common that tracheoscopy should always be practised when this symptom occurs without any sign of pulmonary or cardiac disease (J. S. Fraser.)

In uncomplicated cases of genuine intra-tracheal neoplasm, the trachea externally shows no deviation or distortion, but on direct examination, the growth is at once obvious. A piece should be removed for microscopic examination in order to exclude extra-tracheal tumour.

Prognosis.—If entirely removed, simple growths do not recur, but the prognosis in malignant tracheal growths is unfavourable.

Treatment.—If situated above the level of low tracheotomy, that operation should be performed and a tracheotomy tube inserted. Thereafter the trachea above may be exposed, incised and held open by retractors while the neoplasm is eradicated.

Benign tumours below this level are removed with long forceps inserted through the direct tube. If vascular, hæmorrhage may be started sufficient to embarrass the surgeon and endanger the patient. Attempts at removal

should therefore be preceded by an application of adrenalin, and if possible the growth should be seized close to its attachment and removed entire.

(For Foreign Bodies in the Trachea, see p. 202.)

THE THYROID GLAND

Only those diseases of the thyroid gland will be touched upon which have particular bearing upon our special work. Details of operations are omitted.

The normal thyroid gland is not very obvious on palpation, only an indefinite fullness or thickening being detectable in front of the trachea, where the isthmus occupies a position from the second to the fourth tracheal ring—i. e. about half an inch. The lobes also are inappreciable in health, being overlaid by the sterno-mastoid, sterno-hyoid, and sterno-thyroid muscles.

Attached to the upper margin of the isthmus, the pyramidal lobe, developed from the thyro-glossal tract, may sometimes be felt.

The thyroid gland, being adherent to the trachea and larynx, moves with them in deglutition—an important point in the distinguishing of goitre from other cervical tumours.

AFFECTIONS OF THE THYROID

Any enlargement or tumour of the thyroid body may be termed “goitre”; there are three varieties of goitre: simple, exophthalmic, and malignant.

Simple Goitre is a general hypertrophy of the normal parenchyma of the gland, which, in its endemic form, has been attributed at various times to a large number of different causes. The prevalent opinion of the moment is a revival of the old teaching that goitre, along with its related cretinism, is due to a deficiency of iodine in drinking-water.

Simple parenchymatous enlargement may produce a goitre of very considerable size. In its early stages it reveals itself in a fullness in the lower neck of the general shape of the thyroid gland. It is most commonly found in women, and generally first appears about puberty. The right lobe is usually larger than the left.

A thyroid which has undergone simple hypertrophy is prone to secondary degenerative changes, which may result in the formation of a huge tumour seriously affecting the neighbouring organs and structures by pressure.

These secondary changes are as follows:

1. Fibroid degeneration, forming *Fibrous Goitre*, which may be associated with myxœdema from sclerosis and atrophy of the secreting acini;
2. *Colloid Goitre* where the follicles are dilated and much colloid material is present.
3. One or more of these dilated follicles may enormously enlarge to produce *Cystic Goitre*.

4. One or more areas in the gland may become the seat of adenomatous growths, the adenomatous tissue being largely composed of embryonic thyroid tissue—*Adenoma of the Thyroid*.

In endemic areas *congenital goitre*, and *acute goitre*, the latter of which is marked by rapid enlargement of the whole gland in a few days or weeks, may also be met with. In these localities also endemic *cretinism* occurs. Cretinism is a common cause of deaf-mutism. (See p. 615.)

General Signs and Symptoms.—As a rule, the gland enlarges very gradually, and the enlargement affects lobes and isthmus alike. The early parenchymatous goitre feels soft on palpation, but in the course of months or years, the secondary changes which occur lead to an alteration in the physical characters of the tumour; thus in the larger parenchymatous and other varieties, the gland as a whole is firm from the fibrous changes which are present in nearly all cases.



FIG. 72.—Votive offering showing Goitrous Enlargement of the Neck, found on the Island of San Bartolomeo (Rome) and referred to Etruscan times, about 2000 B.C. (From Messrs. Oppenheimer & Co.)

The pressure of the enlarged gland leads to an atrophy of the overlying muscles, to a backward displacement of the carotid sheath with its vessels and nerves, and to a marked and tortuous stenosis or flattening of the trachea. Pressure on the œsophagus may lead to dysphagia, and compression of one or both recurrent laryngeal nerves to laryngeal paralysis.

In the cystic form, large tense tumours may be felt, differentiated from the main mass of the goitre by their smooth, hard walls.

In adenoma occurring in a goitre, or in an otherwise normal thyroid, the tumour is nodular and rounded.

The most serious symptoms arise from displacement and stenosis of the trachea. Stridor is marked and dyspnoea usual.

Diagnosis.—Simple goitre must be distinguished from exophthalmic goitre and from malignant goitre. A glance at the account given of these two diseases will enable the student to make a correct diagnosis in most cases.

The *prognosis* depends upon the age, the rate of growth, and the size of the enlarged thyroid. Recent slight enlargement may be kept within bounds by simple treatment, and goitres of long standing, which cause no pressure symptoms, and are not increasing in size, may be ignored.

Treatment.—*Preventive.*—Success in preventing goitre among the inhabitants of endemic areas in Switzerland and elsewhere has followed the addition of quite minute quantities of iodine to the drinking-water. Early

goitres may be successfully treated by thyroid tabloids internally, provided there is no tachycardia, from 3 to 5 gr. of the gland substance being given at bedtime. Locally, treatment by the iodine compress may be tried. It is a piece of lint, 3 in. by 2, soaked in—

R	Tc. Iodi	3j
	Glycerin	3ij
	Aq. ad	3j
		M.

applied over the goitrous swelling and covered with oilskin held in position by a bandage round the neck. This application is made every night until the integument begins to peel, when it is intermitted until the skin is well again, and then repeated. In endemic areas the drinking-water should be boiled and personal cleanliness insisted upon.

Surgical removal of a portion of the gland is called for if the goitre is causing dyspnoea or stridor, or if it is rapidly enlarging, the clinical rule being to operate if the patient is unable to breathe comfortably when lying flat. Adenomata are often removed simply to remedy deformity.

Exophthalmic Goitre (Graves's Disease) is supposed to be due to an excessive, and possibly perverted secretion of the thyroid gland, the cause of which is unknown, although some authorities seem to regard the disease as a reaction to the toxins absorbed from some septic focus, in the tonsils, teeth, or nasal sinuses. The thyroid enlargement—unlike simple goitre—is accompanied by constitutional toxic phenomena, which serve to render a well-marked case unmistakable. These are :

1. *Eye Symptoms*.—Along with a variable amount of protrusion of the eyeball (exophthalmos) we generally find von Græfe's sign, which is elicited by making the patient look upward, and then slowly downward. If the upper eyelid delays in the descent of the eye, von Græfe's sign is present.

2. *Tachycardia*, the pulse-rate varying from 90 to 120 per minute when the patient is resting. Palpitation is easily evoked, and cardiac dilation may supervene.

3. *Fine tremors* of the muscles of the limbs and tongue.

Anæmia, dyspepsia, diarrhoea and emaciation are common in addition to the foregoing, and the patient is nervous, irritable and easily excited. Milder forms of the disease, in which tachycardia and irritability of temper are the only signs, are by no means infrequent. Pressure-effects by the enlarged thyroid occur less frequently than in simple goitre.

Diagnosis.—The tachycardia, exophthalmos and pulsation in the goitre differentiate Graves's disease from simple goitre. The combination of a raised pulse-rate with an enlarged thyroid should never be treated with thyroid feeding or with iodine externally.

Prognosis.—Graves's disease lasts for years, but generally tends to slow improvement and recovery, often with a dilated heart. The more severe cases may die of general asthenia and cardiac failure.

Treatment.—In its milder forms, exophthalmic goitre can be controlled

by rest and belladonna, with heart tonics. Exposure of the gland to the action of X-rays is advocated.

A recent method of treatment consists in the administration of m^{v} of a 10 per cent. solution of iodine in rectified spirits of wine, three times a day. But the treatment with iodine is not without danger and should be carefully watched. (See J. R. Fraser, 'Brit. Med. Journ.,' March 13th, 1926, p. 479.)

In the severer cases, the best and most successful treatment is the surgical removal of a lobe of the enlarged gland, and the operation should, if possible, be performed before the heart has begun to fail.

Tonsillectomy in Exophthalmic Goitre.—With the object of removing a possible focus of infection, tonsillectomy, which should be performed under local anæsthesia, is sometimes recommended. The only cases in which it is likely to be of value, however, are those in which the patient is subject to acute tonsil infections, any one of which may endanger life, or lead to a permanent aggravation of the symptoms. The writer's experience goes to show that the removal of quiescent tonsils, even if somewhat enlarged, has no effect upon the general symptoms.

Malignant Disease of the Thyroid Gland is usually sarcomatous in nature, but adenomatous cancer may occur. It generally attacks a thyroid already enlarged, grows with great rapidity, and disseminates widely all over the body. As we have already seen (p. 186), cancer of the thyroid gland may penetrate the tracheal wall and simulate a primary growth of the trachea.

The thyroid may be entirely removed for the disease, but chances of non-recurrence are extremely poor. In the meantime the patient develops myxœdema.

Acute Septic Thyroiditis with the usual phenomena of abscess formation is rare, and so is the interesting *acute* development of a *goitrous enlargement* usually but not invariably appearing in an endemic area.

Accessory Thyroids.—We have already alluded to the mesial lobe of the thyroid, the so-called *pyramidal lobe*, which lies near the middle line, and is attached to the upper border of the isthmus. The pyramidal lobe, which is by no means a rarity, being found in about one-third of all cases, is developed from the lower end of the thyro-glossal tract, which extends from the foramen cœcum of the tongue to the isthmus of the thyroid.

The pyramidal lobe shares in the enlargement in the different forms of goitre, and may itself require removal by operation. When enlarged it is palpable as a long, sausage-like tumour in front of the trachea and larynx, usually inclining to the right of the middle line. It is supplied by a special branch of the superior thyroid artery entering its upper pole.

The presence of a pyramidal lobe would render difficult the performance of a high tracheotomy, and if it can be felt prior to operation, should lead to the selection of the low operation. (See p. 195.)

Lingual Thyroid. An accessory thyroid, which occasionally undergoes enlargement, is that found in the middle line of the base of the tongue

below the foramen cæcum. When enlarged, it forms a smooth, rounded tumour projecting from the upper surface of the organ, visible in the laryngeal mirror, and sometimes also on simple depression of the tongue.

A hypertrophied lingual thyroid may cause difficulty in deglutition and a sensation of embarrassed respiration.

Treatment.—The tumour should be endured unless the thyroid in the neck can be plainly felt, as the lingual thyroid may be the only thyroid gland present, in which case its removal would be followed by myxœdema.

Operation.—If the cervical thyroid is present, the lingual thyroid may be removed by splitting the tongue in the middle line and shelling out the

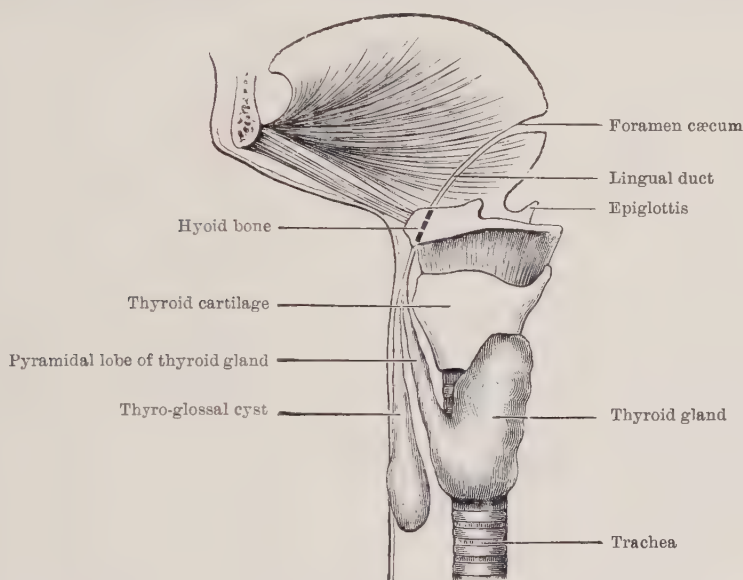


FIG. 73.—Diagram to show the Relation of Parts in Median Cervical Fistula (Thyro-glossal Cyst). (Marshall.) (From Sir J. Bland-Sutton's 'Tumours, Innocent and Malignant'.)

tumour from its base. (Stuart Low.) Or, as this operation is sometimes attended with severe hæmorrhage, sub-hyoid pharyngotomy with splitting of the hyoid may be adopted, preceded by tracheotomy. (H. Bell Tawse, 'Proc. Roy. Soc. Med.,' Laryng. Sect., vol. xvi, p. 22.)

Thyro-Lingual or Thyro-Glossal Cyst.—Along that section of the thyro-glossal tract which lies between the body of the hyoid bone and the upper border of the thyroid isthmus a cyst is liable to form if the tract fails to undergo complete involution (Fig. 73). The cyst, which reaches the size of a pigeon's egg, is situated in or near the middle line of the front of the neck. From its upper border, the duct can usually be felt passing upwards towards the hyoid as a cord about the thickness of a lead pencil.

In the course of time, the thyro-glossal cyst may rupture and discharge

through the skin, forming the *thyro-glossal fistula*, the permanent orifice of which, exuding a scanty secretion, is visible as a puckered depression in the middle line of the neck.

The *only* treatment is by operation, and that needs care, as unless the entire duct is removed the cyst will re-form.

An incision is made in the middle line of the neck from the hyoid bone to the fistula, around which it loops, so as entirely to surround it. The duct is now carefully dissected out as far as the hyoid bone, behind which it disappears, merging into the periosteum of the posterior aspect of the body of the bone. In order to reach the extreme upper point, and to remove every trace of the epithelium-lined duct, the body of the hyoid is divided in the middle line with bone forceps, and the duct tissue behind it removed.

Then the two halves of the hyoid are united with stout catgut sutures, and the skin wound is closed.

The division of the hyoid and removal of the duct behind it may be relied upon to prevent recurrence. The operation should not be performed on children, as the scar left is liable to "spread" and become unsightly during the period of growth. After adult stature has been reached, however, this development is not likely to occur.

TRACHEOTOMY; LARYNGOTOMY; AND INTUBATION

Tracheotomy consists in the opening of the trachea, and the insertion of a suitable cannula for respiration. It is "high," "median," or "low," according to whether the tracheal opening is made above the isthmus of the thyroid; in the situation of the isthmus; or below it. (See Fig. 74.) As a matter of fact, in the high operation it is usually necessary to detach the isthmus from the trachea, and to hold it down while the trachea is being incised, as the isthmus extends normally as high as the second tracheal ring, and in children may reach even higher.

The high operation is the operation of urgency; it is, therefore, the most frequently performed. Both the median and the low tracheotomy are operations of deliberation.

Indications.—Tracheotomy is indicated when asphyxia is threatened by any obstruction in the air-passages above the episternal notch. It is also performed when a loose foreign body is known to be present in the trachea or bronchi, and for the administration of a general anæsthetic in certain operations on the larynx and pharynx.

Contra-indications.—In phthisis pulmonalis, with tuberculous disease of the larynx causing stridor, tracheotomy may become necessary, but it should be postponed as long as possible, as its effect upon the lung disease is harmful.

Anæsthesia.—In adults, the operation is best performed under local anæsthesia, especially if there is any impediment to breathing in the larynx or pharynx. In children, general anæsthesia under chloroform is necessary.

But if the patient, whether adult or child, is in process of being

asphyxiated, there is no time for anæsthetic of any kind. Moreover, the carbon dioxide poisoning dulls the sensibility to pain.

Operation.—The instruments required are : scalpels ; dissecting forceps ; pressure forceps ; small retractors ; sharp hook ; dilators ; and tracheotomy tube with pilot.

Position.—The patient lies on his back with a pillow or sandbag under the shoulders and the head as well extended as the breathing will permit of.

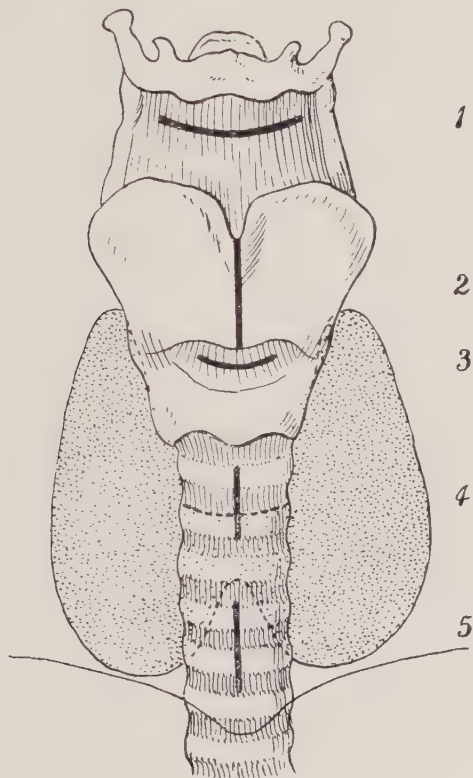


FIG. 74.—Larynx (Diagrammatic).

Incisions for (1) Subhyoid Pharyngotomy ; (2) Thyrotomy (Laryngo-fissure) ; (3) Laryngotomy ; (4) High Tracheotomy ; (5) Low Tracheotomy.

In certain conditions, full extension of the head still further embarrasses the breathing. The operator stands on the right-hand side of the patient, an assistant steadies the head, keeping the middle point of the chin and the episternal notch exactly in line throughout the operation. He may also administer the chloroform. If a second assistant is available, he takes his stand on the side opposite to the surgeon.

All instruments should be laid out before beginning the operation. The surgeon should operate under guidance of head-light if possible.

In the following description, it is assumed that the operation is deliberate. Emergency tactics will be described later.

Local Anæsthesia.—With a suitable syringe, the middle line of the neck from the cricoid to the sternum is infiltrated with 1 per cent. sol. of novocaine in water with a few drops of adrenalin in it. The needle is passed first immediately under the skin to its full extent, and then as it is being withdrawn, the solution is squeezed out. Two or three separate punctures may be required. Next the needle-point is passed more deeply into the fascial layers, the solution again being ejected as it is withdrawn. A third and a fourth series, still deeper, are usually necessary, and finally the needle point is plunged as deep as the trachea itself. Three to five minutes may be spent in gently massaging the injected area, and then the first incision may be made.

(1) **High Tracheotomy.**—The field having been prepared in the usual manner, the surgeon sees that everyone is in place, and all instruments to hand.

Then steadying the larynx between the fingers and thumb of the left hand, he makes an incision at least one and a-half inches long from the level of the cricoid cartilage downwards exactly in the middle line, dividing skin and superficial fascia from end to end in successive sweeps. A few strokes of the knife brings him to the level of the sterno-hyoid and sterno-thyroid muscles, the interval between which is opened up by the blunt dissection. Now follow the one or two layers of fascia and areolar tissue that cover the trachea above the thyroid isthmus. These are penetrated by means of sharp cuts and blunt dissection, veins being avoided if possible, or divided between ligatures if time permit, otherwise they are cut between pressure-forceps.

The thyroid isthmus becomes visible as a soft reddish cushion. It is cleared from the trachea and pulled down. Incision into the thyroid should be avoided, as it is very vascular. A little more dissection brings us to the trachea, which should be exposed so thoroughly that its white rings are clearly seen.

Throughout this dissection, keep to the middle line. This rule is extraordinarily easy to transgress. If the assistant allows the chin to fall to one side; if the skin incision has deviated, even slightly; if a pair of artery forceps holding a vessel drags the wound to one side, the operator will go astray. The operator should retain his hold of the larynx throughout, and should keep feeling his way down to the trachea by constant palpation with the left forefinger.

But however plainly he *feels* the tracheal rings he should *not incise* them until he *sees* them.

The amount of trachea exposed should be rather more than is sufficient to accommodate the tracheotomy tube.

To resume: The trachea is now exposed. At this point, if time permits, puncture the trachea between two rings with a hypodermic needle, inject a few drops of 10 per cent. sol. cocaine within it, and wait five minutes for

the anæsthetic effect. This obviates coughing after the tube is inserted. (For contra-indications to this step, see later.)

Next, the sharp hook, its point turned towards the patient's chin, is plunged into the trachea immediately below the cricoid, and given to the assistant to hold. He holds it in such a way as to pull the trachea well forward into the wound, and is instructed on no account to remove the hook, or to let it go.

The surgeon then, with shortened scalpel, its edge towards the cricoid, stabs the trachea about the third ring and carries the incision upwards as far as the sharp hook. The air can now be heard hissing into the trachea.

The dilator is next passed into the tracheal incision, opened and held open with the surgeon's left hand, while between its blades the tracheotomy tube, with its pilot in position, is passed. The pilot is withdrawn, and if the air is entering freely through the tube, the dilator is withdrawn. Finally the surgeon takes the sharp hook out of his assistant's hand, and removes it himself from the trachea.

Ligatures are tied where pressure forceps are holding vessels; the shield of the tracheotomy tube is unscrewed and allowed to find its own level, then made secure again, and the gaping part of the skin-incision is sutured.

(2) **The Median Operation.**—The same incision, prolonged as far as the episternal notch, is employed. The early steps are the same as in the last operation, but when the isthmus of the thyroid is reached, it is cleared, and raised from the trachea by means of a grooved director passed under it. A couple of stout ligatures are passed under the isthmus, and tied in order that it may be divided between them. This done exposes the tracheal rings, and the operation is completed as in the high operation.

(3) **Low Tracheotomy.**—*Indications.*—The low operation is preferred when the larynx is the seat of the disease, as of cancer or tubercle, since then it is important that the tracheotomy wound should be as remote as possible from the affected regions. The low operation is deeper, takes longer to perform, requires a longer tube, and there is apt to be more trouble during convalescence than with the higher operations.

Operation.—The incision extends from the cricoid to the sternum. A variable depth of cellular tissue and fat must be penetrated before the deeper layer of the cervical fascia and the sterno-hyoid and thyroid muscles are reached. Here those muscles of either side are in contact, and the interval between them must be precisely hit upon and opened up by blunt dissection. This gives access to another layer of cellular tissue, containing the inferior thyroid plexus of veins, which must be turned aside or divided between ligatures. Finally, the pretracheal layer of fascia is reached, and this being divided enables the surgeon to clear and expose the tracheal rings.

The subsequent steps for opening the windpipe and inserting the tube are the same as for the other operations, but a longer tube is required, or it will slip out of the trachea after the operation, and be a source of difficulty and danger until it is replaced.

Emergency Tracheotomy.—The above operations are described as they

are performed under favourable conditions, with the patient placid and free from impending asphyxia, such as we find when a precautionary tracheotomy is performed.

In the presence of grave obstruction the operation becomes at once more difficult and more urgent, and with the time at our disposal so brief, deliberate dissection must be abandoned.

The high operation should be chosen, the trachea should be rapidly exposed by sharp dissection, bleeding points being quickly caught with pressure-forceps, or ignored, since when easy breathing is restored, the veins empty, and the bleeding stops of its own accord. Everything is sacrificed in order to open the trachea as speedily as possible.

One point only must be carefully watched. The *tracheal incision must not traverse the cricoid cartilage*. This precaution omitted, as it easily may be in children, there will be difficulty later on in getting rid of the tracheotomy tube. (See p. 181.)

In this operation, there having been no time for an intratracheal injection of cocaine, a violent blast of coughing follows the insertion of the tube, and blood and mucus are blown up in the operator's face, unless he holds a pad of gauze over the tube. At the same moment, also, he must put his finger on the edge of the tube, or it may be coughed out of the tracheotomy opening. This bout is succeeded by a period of complete apnœa—physiological apnœa, due to the free inspirations that follow the introduction of the tube. It may be ignored.

In the **most urgent** cases, the trachea can be opened by *one stab of the knife* and without any anæsthetic, local or general.

The larynx is held as in the ordinary operation, but the fingers pressed in behind it pull it forward, thus rendering the skin tense. The blade of the knife is inserted straight through the skin, and down into the trachea, about the level of the first or second ring. As soon as it is felt to be in the trachea, cut carefully upwards for about half an inch. As the knife is withdrawn, press the finger into the trachea, and then insert the tube as the finger is withdrawn. (Lambert Lack.) Or, if a dilator is at hand, it may be inserted instead of the finger, opened, and the tube put in.

Hints in performing tracheotomy.

1. See that the head is well extended and held steady.
2. Let the light be the best procurable. Use a head-light or mirror if possible.
3. Do not turn aside for bleeding; it is the trachea you are after.
4. A long skin incision enormously facilitates progress and increases safety.
5. Do not inject cocaine into the trachea in children, or if you wish the patient to cough, as in diphtheria or when there is suspicion of a foreign body loose in the trachea.
6. The sharp hook is the key to the position. Insert it well into the trachea; hold it, or have it held there until everything is finished and the patient quiet; then remove it yourself.

7. If bleeding continues from the wound after the operation, keep the patient anaesthetized, seize the deeper layers of the cut edges, and evert them without disturbing the tube until you find the bleeding point, which you then catch and ligature.
8. If blood is entering the tracheal wound, and setting up cough, and you cannot at once find the bleeding point, turn the patient over, and let the blood run out of the wound.
9. See that the trachea is opened in the middle line, and that the tracheal incision is long enough to receive the tube.
10. Hold the knife short in opening the trachea, so as not to wound its posterior wall.
11. Have the tracheotomy tube lubricated before trying to insert it.
12. Pass it through the expanded blades of a dilator if that instrument is at hand.
13. The insertion of the tube is often difficult. See that it gets into the trachea, and that the air is actually passing freely through it.
14. Do not remove the sharp hook until the patient is breathing comfortably through the tube.
15. Do not forget the inner tracheotomy tube.

Tracheotomy Tubes.—Parker's (Fig. 75) is the best for children; Durham's lobster-tail (Fig. 76) for adults. A very long Durham (Fig. 77) is often necessary for low tracheotomy.

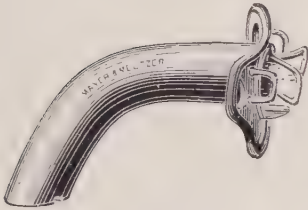


FIG. 75.—Parker's Tracheotomy Tube.

After the tube is inserted, and before the skin is sutured, the tube is secured by tapes tied round the neck.

After-treatment.—A square of gauze, slit for the tube and introduced from below under the shield of the tube, is all that is required by way of dressing. No special tent or steam-kettle is necessary. A nurse must be at hand to wipe discharges away, and to

keep the tube clear. This is done by means of a feather. The inner tube will need removing and cleaning from time to time.

The first day or two after the operation is a period of anxiety. If the patient is comfortable, the outer tube should on no account be taken out for cleaning for at least seven days. If it is, the layers of the neck close up, and the opening of the trachea may be lost, and with it the patient's life.

After seven days, a track is formed lined with granulations. But even then, the changing of the tube must be carefully arranged. A second tube of the same pattern must be at hand to insert as soon as the first tube is removed, and with it dilators and forceps. All instruments must be laid on a table by the side of the bed, and *not on* or near the bed, for if the patient gets excited, he will move and send them flying. Work, if possible, with a head-light, or with head-mirror and lamp.

If shortly after the operation the patient starts to cough, and continues coughing, probably the inner end of the tube is pressing on the tracheal wall and irritating it. Loosen the screw of the shield, and let it readjust itself.

If the coughing still continues, the patient may cough the tube out of the trachea, especially if it is a deep tracheotomy and the tube is rather

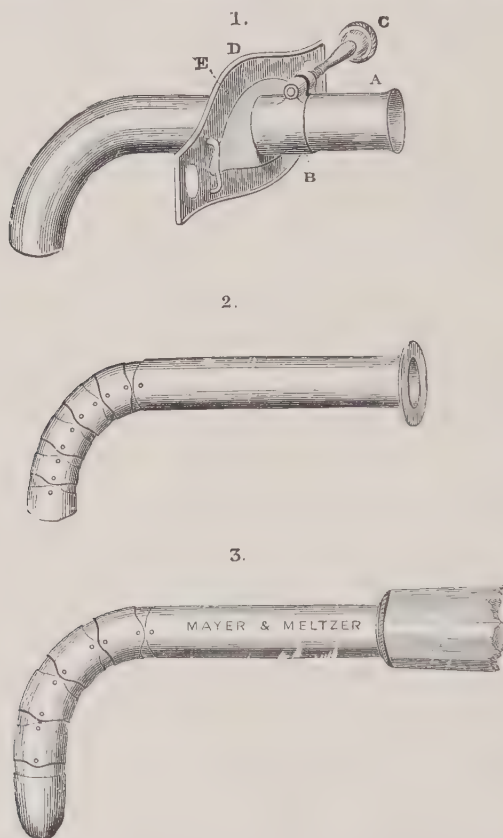


FIG. 76.—Durham's Tracheotomy Tube. (1) Outer tube and adjustable shield. (2) Inner tube (lobster-tail joint). (3) Pilot for introducing.

short. Under such circumstances the tube must be replaced by a longer one.

Prepare as before, but as soon as the first tube is removed, insert the dilator into the trachea, so as to keep the route open, and then insert the new tube through the blades of the dilator.

Coughing, if the tracheal wound is too large, and the skin is sutured, may induce emphysema. If this appears, remove one or two skin sutures. These manipulations may be facilitated, and the coughing soothed, by a

little cocaine solution dropped into the trachea through the tube. But persistent coughing means an unsuitable or ill-adjusted tube, for which cocaine is useless.

Constriction of the trachea below the tracheal opening, as from a low goitre, may be overcome by the use of a long flexible tracheotomy tube, such as Koenig's. As a temporary expedient, a length of drainage-tubing may be sufficient to permit of respiration being carried on.

The **Removal of the Tube** is undertaken as soon as the obstruction to the breathing has been got rid of. There is, as a rule, no difficulty in deciding when it may be done, as we can easily tell when the air is passing freely through the larynx again, and in any case this can be ascertained by trying whether the patient can breathe with the tracheotomy tube blocked.

When he can do so, and there is no likelihood of a recurrence of the stenosis, the tube can be removed. A small pad of gauze and a strip of

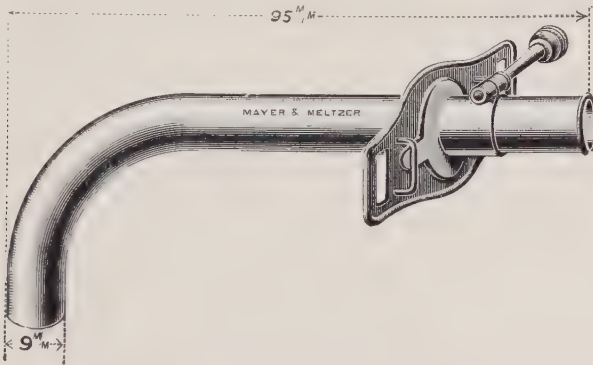


FIG. 77.—Specially long Tracheotomy Tube for low tracheotomy.

sticking-plaster across the neck so as to bring the edge of the tracheotomy opening together is all that is needed by way of dressing. The fistula closes readily.

Where the laryngeal or tracheal stenosis is permanent, the tube must also be worn permanently. In that case, the metal tube should be exchanged, after the track is formed, for a rubber tube, as the latter is much more comfortable to wear. This rubber tube should be removed, cleaned and re-inserted daily, and as soon as it begins to show signs of wear, it should be replaced by a new one. These details the patient can attend to himself.

The wearing of a tube does not seem to have any harmful effect upon health; tracheotomy tubes have been worn for over fifty years on end.

Inability to remove the tube by reason of laryngeal swelling due to a tracheotomy which has been made too high has already been discussed (p. 181). In addition to such obvious causes, it occasionally happens that a child fears the removal of the tube so much that asphyxia will be produced from sheer fright, or glottic spasm, if it is removed. This difficulty may be

overcome by removing the tube under an anæsthetic, or by blocking it while the child is asleep.

LARYNGOTOMY

Description.—The opening into the larynx through the crico-thyroid membrane, as a temporary measure.

Indications.—Its most frequent use is in operations about the pharynx in adults, to permit of the more easy administration of the anæsthetic, and to prevent blood passing into the air-passages, since the upper part of the larynx can be packed after laryngotomy. But modern developments, such as the intratracheal administration of ether, have rendered laryngotomy less frequently necessary than it used to be. It is still occasionally

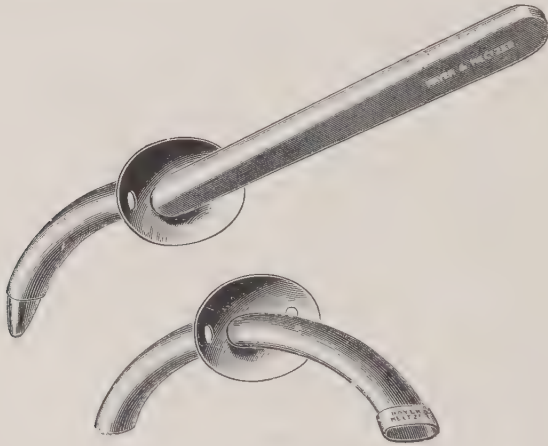


FIG. 78.—Laryngotomy Tube with Pilot and Inner Tube.

performed, however, in place of an emergency tracheotomy in adults. In children, the space is too narrow to admit a tube.

The laryngotomy tube should not be worn longer than twenty-four hours.

Operation.—The patient is placed in the tracheotomy position.

The operation may be done under chloroform; local anæsthesia; or no anæsthesia at all.

A vertical fold of skin opposite the upper border of the cricoid cartilage is picked up, transfixed from side to side with a knife, and cut through so as to make a transverse incision about an inch in length. A pair of sharp-pointed scissors curved on the flat is plunged directly through the crico-thyroid membrane downwards and backwards in the middle line, keeping close to the upper border of the cricoid. The scissors are then opened wide, and the short, oval laryngotomy tube (Fig. 78) or a small Durham tracheotomy tube is inserted. See that the scissors are well into the

air-passage, as one is apt to pass the tube between the crico-thyroid membrane and the tracheal mucosa.

In an emergency, laryngotomy may be performed by a single stab of the knife through the crico-thyroid space, its place being taken by dressing-forceps inserted and opened.

After-treatment.—The tube having been removed after operation, the wound heals up quickly.

Intubation is sometimes preferred to tracheotomy for laryngeal diphtheria. It consists in passing into and leaving in the larynx an intubation tube of a size suitable to the patient's age. (See Fig. 79.) It is performed without an anæsthetic. The child is held upon the nurse's knee as described at p. 17. The mouth is propped open with a gag, inserted and held by an assistant standing beside the patient. The tube is threaded and held by the introducer, which the surgeon holds in his right hand, the thread being attached to his little finger. He passes his left forefinger into the throat, and with it hooks forward the small epiglottis. The introducer and tube, the latter with the beak turned posteriorly, are then passed into the mouth, the end of the tube passing under the tip of the left forefinger to enter the larynx, which it does in a direction downwards and forwards. The introducer is now detached. If properly inserted the dyspnoea is relieved at once. The thread is attached to the cheek with sticking-plaster.

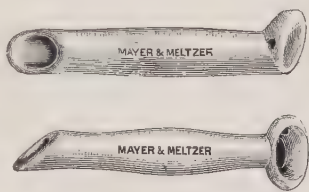


FIG. 79.—Intubation Tubes.

Difficulties.—The chief difficulty is the finding of the laryngeal orifice in a struggling, semi-asphyxiated child, and even after it is found, one is apt to slip the tube past it into the œsophagus.

After it is inserted, a violent fit of coughing may eject the tube, and it has to be put in again. This can be prevented by using as large a tube as possible. And the use of a large tube also prevents its slipping down through the larynx into the trachea. Tracheotomy instruments should be at hand in case of need.

If, later, the tube is suddenly blocked, and the child is threatened with asphyxia, the nurse at once pulls it out. This accident seldom happens.

Removal of the Tube must be effected not later than five days after its insertion in diphtheria. It is pulled out by the thread, or if that has been removed, by the extractor. In little children, we can eject the tube from the larynx by compressing between thumb and finger the outside of the trachea, cricoid and thyroid cartilages from below upwards—"milking the larynx," as it is called.

Intubation for Cicatricial Stenosis of the Larynx.—Intubation tubes made of vulcanite of graduated sizes are used, and, being introduced, are worn for prolonged periods. By gradually increasing the calibre of the tube, the lumen of the larynx may be gradually and permanently expanded until it is possible for the patient to respire through it (p. 181).

FOREIGN BODIES IN THE TRACHEA AND BRONCHI

If large enough to block the lumen of the *trachea*, a foreign body will probably be arrested in the larynx, and cause instant death if not immediately removed therefrom. (See p. 182.) But if small enough to pass the guardian glottis it may remain free in the trachea, or, being aspirated into a bronchus, it may there become impacted. Foreign bodies are seldom arrested in the trachea.

If free to pass up and down the windpipe, violent expiration or coughing propels the foreign body every now and again against the under surface of the vocal cords, whereby glottic spasm is set up; or it may, by chance, become arrested in the chink of the glottis and cause death by asphyxia. Many of these cases concern young children from whom no history is obtainable, and thus whenever recurrent transitory attacks of glottic spasm, sudden and violent, occur in a child, we should always look for a foreign body, an X-ray examination being made as well as a direct examination of the trachea.

Foreign Bodies in the Bronchi.—It is not generally realized that acute pulmonary diseases such as broncho-pneumonia, pulmonary abscess and empyema, and chronic changes such as cavitation, fibrosis and even pneumothorax, are sometimes due to the presence of foreign bodies in the bronchi. Moreover, as the patient may be unaware of having aspirated a foreign body, the real cause of his illness may remain unsuspected. Nevertheless, as we hope to show, it is possible to detect their presence by attention to certain definite signs and symptoms.

As a matter of fact, in the majority of cases the patient is quite aware of this mishap, for, although the immediate symptoms induced by a foreign body passing through the larynx and trachea are sometimes slight and transitory, more usually they are of a kind to attract attention and even to arouse alarm, consisting as they do of a sudden sensation of choking, sometimes with genuine difficulty in breathing, and accompanied by violent coughing and perhaps glottic spasm. In addition to these, the symptoms of invasion, subglottic oedema from the direct traumatic effect of the intruder, may, particularly in children, produce a croupy cough and dyspnoea lasting for several days.

We have already discussed the symptoms of a foreign body loose in the trachea. If, however, it reaches the bronchial tree and becomes fixed there, the initial distress subsides, often quite quickly, and a period of quiescence ensues of longer or shorter duration according to the nature of the foreign body and the site of its arrest—unless, that is to say, in its new situation it completely blocks a main bronchus, for then the dyspnoea will continue without any quiet interval.

After the quiescent period phenomena of obstruction and irritation sooner or later appear, and these may go on, as we have already hinted, to induce changes both extensive and profound.

Foreign bodies that find their way into the tracheo-bronchial tree are

of extraordinary variety. The simplest way to classify them is to divide them, according to their effect upon the tissues, into the less irritating and the more irritating.

In the former we find metallic and inorganic bodies generally, and especially those which, like glass beads, are round, smooth and non-absorbent. Pins, also, albeit sharp-pointed, are comparatively innocuous, and so, curiously enough, are bones and pieces of meat.

In the more irritating class are found such organic, decomposable objects as nuts, grains, seeds, and so on. And of these the monkey-nut (called in America the pea-nut) is the most dangerous. Teeth, likewise, which occasionally pass into the air-passages during an extraction under general anæsthesia, set up violent reaction by reason of their septic condition. And into this class also we must place prickly, spiky and sharp-edged inorganic bodies like tacks and chips of glass, which irritate the tissues in wounding them.

The *Site of Arrest* depends upon the size, shape and disposition of the body. About two-thirds enter the right main bronchus, and most of them become arrested at or just below the giving-off of the right upper lobe bronchus. Of the smaller, the secondary bronchi, the large posterior branch of the left lower lobe is that most frequently occupied.

The *Pathological Effects* of a foreign body in a bronchus consist, broadly speaking, of a combination of obstruction and septic infection.

Both irritating and non-irritating bodies are alike, of course, in the fact that the amount of obstruction they produce depends upon the size of the bronchus in which they are lodged. In other words, their mechanical effects are similar. But they differ profoundly in the kind of tissue-reaction they arouse. If the body is vegetable in nature, absorbent and organic, it swells, softens and often breaks up into a number of fragments, which become scattered about among the smaller bronchi, and set up septic, sometimes virulently septic changes of the pneumonic order, in which event infective symptoms, local and general, dominate the clinical picture.

Prior to the septic invasion, however, and sometimes subsequent to it as well, obstructive phenomena are present, and in the case of non-irritating bodies such obstructive phenomena predominate for a considerable time. We proceed now to discuss them.

When a main bronchus is blocked, the whole of the corresponding lung is affected. When one of the smaller tubes is blocked, only one lobe, or a portion thereof, will suffer. The effects depend upon whether the obstruction is complete or incomplete.

(a) If a foreign body plugs a bronchus completely, the air in the corresponding portion of lung is rapidly absorbed, and the lung either collapses or becomes cedematous.

(b) If the foreign body acts like a valve, letting air in but not out, the lung beyond becomes over-distended and emphysematous, and may even rupture and produce pneumothorax.

(c) If there is only partial obstruction so that the air can pass in and

out, the secretions will escape. But after a time, the bronchial mucosa in the neighbourhood of the foreign body swells; granulations sprout up and bury it; and then the phenomena of complete obstruction appear.

Whatever the character of the obstruction and the type of the foreign body, sooner or later in all cases suppuration occurs below it, and in the non-irritating variety this tends in the course of time to pass on to abscess formation, or to bronchiectasis with fibroid changes. Even emphysema may occur.

Speaking generally, the irritating group tend to cause acute, the non-irritating group chronic inflammatory changes.

Symptoms.—The initial symptoms, as we have seen, vary in severity, from an entire absence of any disturbance to asphyxia, which may be immediately fatal. If the patient survive the onset, and the period of quiescence has passed, the subsequent symptoms vary with the patient's age and with the character and position of the foreign body.

In children, reaction is always more acute than in adults. Septic phenomena appear earlier and are more severe, so that, if the foreign body is of the vegetable kind, the child quickly becomes desperately ill, with high fever, rapid pulse and breathing—all the appearances, in short, of widespread broncho-pneumonia. For it is characteristic of such cases that the inflammatory changes spread beyond the locality of their origin. They may extend even to the other lung. These cases are often fatal, even, it may be, after the foreign body has been successfully removed.

On the other hand, when the foreign body is one of the less irritating varieties, and is fixed in one of the smaller bronchi, the symptoms at first, both in children and in adults, may not be sufficient to attract much attention. But after a time, if the body is not discovered and removed, cough and purulent expectoration, by and by becoming foetid, make their appearance. If, however, one of the larger bronchi is blocked and an extensive area of lung is put out of action, dyspnoea and, it may be, cyanosis will be present from the earliest period.

Hæmoptysis is by no means unusual at any stage. Pyrexia, also, is often present. Pain in the chest is sometimes a prominent feature, sometimes not.

Chevalier Jackson has directed attention to what he calls "the asthmatoïd wheeze" as a valuable sign of the presence of a foreign body in a bronchus. Most noticeable at the end of a forced expiration, it is louder and of higher pitch than the wheeze of true asthma, and though audible at the mouth, it is inaudible through the chest-wall. Along with the asthmatoïd wheeze one can sometimes hear a "slap" with each respiration.

Physical Signs show considerable variety. But one sign—limitation of movement of the affected side of the chest—is almost invariably present.

When the block in the bronchus is complete, the affected area is dull to percussion; there is an absence of vocal fremitus; *riles* may be audible; and the respiratory murmur is deficient.

When the air is passing in but not out, the affected area is hyper-resonant, vocal fremitus is absent, and the signs may resemble those of pneumothorax, which, indeed, may be present, as we have seen.

A shift in the locality of such signs corresponding to a shift in the position of the foreign body is a fact of much value when it can be observed.

X-ray Examination is imperative, unless the history indicates that the foreign body is of a vegetable nature and likely to induce acute pulmonary sepsis. In that case immediate search for it should be made with the bronchoscope.

If the foreign body is opaque to the rays a skiagram will reveal its presence and also its position. The exposure, especially when a fine body like a pin is being sought for, should be instantaneous, otherwise its movements with respiration will prevent its image appearing. Radiologists

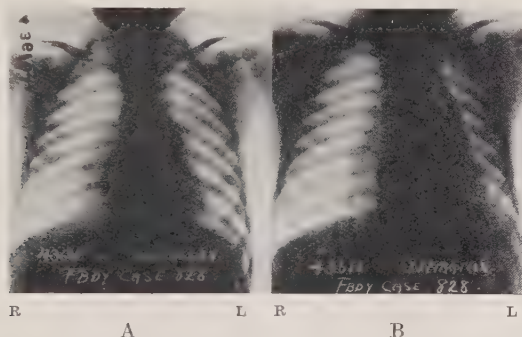


FIG. 80.—Non-opaque Foreign Body in Right Main Bronchus.

Skiagrams of thorax (A) during inspiration; (B) during expiration. Note distension of right intercostal spaces and depression of right half of diaphragm uninfluenced by respiration, contrasting with the left side. The right side of the thorax is distended and fixed, indicating emphysema of the right lung from a non-opaque foreign body in the right bronchus acting like a ball-valve. (Case of Dr. R. P. Mathers.)

have become highly expert in locating precisely the situation of a foreign body in the chest, but in the case of a nervous child, several attempts may be necessary before a satisfactory negative can be obtained. It is frequently advantageous also, as Tilley was the first to point out, to make the bronchoscopic search for a foreign body under the guidance of X-ray illumination, with the screen in the hands of the radiologist directing our manipulations.

Even when the foreign body is transparent to the rays, radioscopy is of value, as it may show changes from which we can deduce the presence of an obstruction in a bronchus. Thus undue transparency of one lung, with depression and partial fixation of one-half of the diaphragm (see Figs. 80 and 81), will indicate pulmonary over-distension from unilateral obstruction. On the healthy side, the diaphragm will show an increased excursion.

Sometimes the radiogram shows a shadow in the region of the lung below the block.

Diagnosis.—As may be gathered from the foregoing description, a foreign body in the lung may escape discovery, especially when the history furnishes no suggestion of its presence and the body is transparent to X-rays.

Early symptoms, like croupy cough and dyspnoea, are liable to be mistaken for laryngeal diphtheria, especially in children. But McCrae, to whom we are indebted for much of our information on this subject, points out that the voice is generally hoarse in diphtheria, whereas it is clear in the subglottic oedema following the passage of a foreign body. ('Journ. of Laryng.,' vol. xxxix, p. 324.)

The later symptoms in acutely septic cases may be regarded as due to



FIG. 81.—From the same case as Fig. 80. After removal of foreign body. Both sides of thorax acting equally. (Case of Dr. R. P. Mathers.)

simple broncho-pneumonia, while the more chronic changes are apt to be mistaken for phthisis pulmonalis, particularly so, according to Chevalier Jackson, when the foreign body is a pin.

The most valuable indication is to be found in the history, and the belief of a patient that he has "swallowed" a foreign body should always be credited, and should lead to a thorough search for it with all diligence and dispatch. Apart from the history, the asthmatoïd wheeze, with the "slap," and the results of careful X-ray examination are of the utmost importance.

Patients suffering from bronchiectasis, the pathogenesis of which is seldom quite clear, should always be examined for a possible foreign body.

The *prognosis* is grave until the foreign body has been removed and its effects have disappeared. The sooner, therefore, it is located and removed the better. A small number of cases are on record of the harmless sojourn of a foreign body in the lungs, but they must be regarded as curiosities.

main bronchial systems. We may be visually guided to the site by local signs of inflammation.

The dangerous nature of such objects renders their immediate removal important, and every effort must be made to extract them entire. For this reason, no time should be wasted with upper bronchoscopy; tracheotomy ought straightway to be performed, and lower bronchoscopy adopted. The same rules are to be followed as described above, but the forceps used must grasp the body softly, so as not to break it or crush it into fragments. If it has already become disintegrated, every effort should be made to follow up and remove all accessible fragments.

Granulations may have sprouted up on the proximal side of the foreign body, and may conceal it. Application of adrenalin solution will cause them to shrivel, otherwise the forceps must be passed through them, and the foreign body groped for.

It is sometimes possible, in the case of round, slippery bodies, to pass the end of the tube close on to the body, and then to make a pad of wool, soaked in oil or vaseline on a long swab-holder, act in the tube as a piston, aspirating the foreign body against or into the tube, so accomplishing its removal.

When the body is too long or large to enter the tube the forceps are made to retain their grasp, and tube, forceps and foreign body are all removed together. This manœuvre is obviously unsuited to sharp or pointed bodies, but such bodies can generally be manipulated so as to enter the tube.

Search for a foreign body in a case of bronchiectasis is a difficult manœuvre, as the pus is both copious and foetid, even when this factor is minimized by keeping the patient inverted for a day or two before the operation.

(For the extraction of objects like safety-pins, see p. 227.)

If bronchoscopic attempts to remove a foreign body fail, as they do occasionally, pneumonotomy (external operation through the chest-wall) may be resorted to, but only if it is causing suppuration. Pneumonotomy is a dangerous operation, and if the foreign body is not threatening life we are justified in temporizing. (See 'Journ. Amer. Med. Assoc.,' vol. lxxvii, No. 18, October 8th, 1921, and 'Brit. Med. Journ.,' October 17th, 1925.)

Results.—Of 39 foreign bodies in the trachea and bronchi reported from 1908 to 1918 (see Irwin Moore, 'Proc. Roy. Soc. Med.,' Laryng. Sect.,

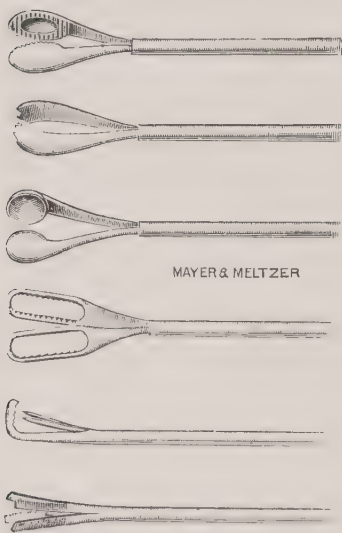


FIG. 83.—Various Bronchoscopic Forceps for Foreign Bodies.

vol. xii, p. 14), 3 were situated in the trachea, and all were removed through the direct tube without a fatality. Of 35 in the bronchi, 29 were removed by per-oral bronchoscopy; 2 by bronchoscopy through a tracheotomy opening; 3 were coughed up through the bronchoscope; in 1 bronchoscopy failed, but the body was successfully removed by pneumonotomy. There were no deaths.

Of 27 cases of a pin in the lungs, reported in America, 16 in the bronchi of the upper and middle lobes were all successfully removed through the bronchoscope. Of 11 in the lower lobe, however, only 4 were successfully removed by bronchoscopy. The 7 others lay in the posterior bronchi of the lower lobe, and of these 2 were removed by pneumonotomy; 1 was coughed up, and 1 disappeared. One death took place after pneumonotomy, and 1 from pulmonary abscess.

Chevalier Jackson reports from his own cases 98 per cent. of successful bronchoscopies. But this must be looked upon as the high-water mark.

THE ŒSOPHAGUS

The following are some anatomical facts of clinical importance regarding the œsophagus:

The length of the food-passage from the incisor teeth to the gastric orifice is 14 to 16 inches. The laryngo-pharynx narrows to become the upper end of the œsophagus opposite the cricoid cartilage and the sixth cervical vertebra. The lower end of the gullet pierces the diaphragm opposite the tenth dorsal vertebra and enters the stomach opposite the eleventh.

There are three constrictions—one at the commencement, the other, very slight, opposite the aortic arch or bifurcation of the trachea (about 13 inches from the incisors), and the third where the gullet pierces the diaphragm. Strictures of the œsophagus, both malignant and cicatricial, are commonest at these constrictions, and foreign bodies are most readily arrested at these points.

The upper or post-cricoid constriction belongs, strictly speaking, to the pharynx and not to the œsophagus, seeing that the muscular fibres are the lower fibres of the inferior constrictor pharyngis, which are here strengthened to form a sphincter. But for our present purposes, we shall consider this region along with the œsophagus, except in so far as post-cricoid cancer is concerned, that having already been dealt with. (See p. 78.)

ŒSOPHAGOSCOPY

The direct telescopic tubes used for the trachea and bronchi may also be used for the examination of the œsophagus, but there are many other varieties at our disposal. The length and calibre are dictated by the age of the patient, but it is a safe rule to use a wide tube when searching for a foreign body, and a narrow tube for ordinary examination, and especially when malignant disease is suspected.

The passage of the tube into the œsophagus is much more difficult, and it is also more dangerous than tracheoscopy, but attention to the following directions will minimize both difficulties and dangers alike, particularly if the surgeon is careful to avoid force and haste.

Anæsthetization.—Local anæsthesia, when it can be satisfactorily accomplished, is safer than general anæsthesia. It also permits of the sitting position, which has many advantages over the recumbent.

In children, however, a general anæsthetic will usually be necessary.

In inducing local anæsthesia for œsophagoscopy, the pharynx and larynx are anæsthetized as described at p. 104. In addition, by means of long bent swab-holders, the laryngo-pharynx is reached by way of the pyriform fossæ. As the œsophagus proper is devoid of acute sensibility we do not require to anæsthetize it.

Before the sitting the patient should receive a dose of morphia and atropine hypodermically (gr. $\frac{1}{4}$ morph. and gr. $\frac{1}{100}$ atropine sulph.) to calm apprehension, and reduce salivary secretion.

Method.—The passage of the instrument as far as the introitus laryngis is as in direct laryngoscopy.

The left arytenoid eminence having been recognized, the end of the tube glides past, not over it, into the left pyriform sinus, and so into the laryngo-pharynx, while at the same time the proximal end of the tube is borne rather backwards and towards the right angle of the mouth. After entering the laryngo-pharynx, the tube is arrested for a longer or shorter time by spasm of the post-cricoid sphincter, and as all that is visible through the tube at this place is smooth mucosa, without pucker or break, the operator is apt to think his direction is false. After a minute or two of waiting, the end of the tube should be pressed forward, so as to carry the cricoid cartilage in an anterior direction. At the same time the tube is pushed on downwards, but not forcibly. Then quite suddenly the œsophageal orifice will gape, and a little further advance brings the end of the tube into the œsophagus proper, which in normal cases is now open and visible as far as the lower thoracic section as a pale, smooth-walled, gently-curved tube, against the left side of which the heart can be seen beating.

The œsophagoscope, correctly directed, now passes on without any difficulty, if the œsophagus is healthy, to just above the diaphragmatic constriction, at which level the patient's head, hitherto held slightly forward and deviated slightly without rotation to the right so as to bring the end of the tube into the correct position for the lower œsophagus, should now be more fully extended. The diaphragmatic constriction is more easily negotiated than the cricoid sphincter, and then, the short abdominal œsophagus having been traversed, the end of the tube enters the stomach.

The withdrawal of the instrument should be very slowly effected, and under inspection throughout, as it is often possible to make a more searching and deliberate scrutiny of the mucosa during withdrawal than during insertion.

When the œsophagus is the seat of disease or a foreign body, it usually does not manifest itself as an open canal after the tube has passed the cricoid level, but remains closed as far as the obstruction. When, therefore, after passing the cricoid sphincter the œsophagus fails to open out in front of the tube, we should take that as a warning to be cautious in our further efforts.

Dangers.—The wall of the œsophagus is delicate, and is easily torn, especially when it is infiltrated with cancer, and a rupture almost invariably leads to septic mediastinitis and death. Rupture is also easy to produce in cases of pouching, the end of the œsophagoscope being inadvertently pushed through the *cul-de-sac* of the pouch. If the accident is recognized at the

moment, and if the tear is situated at or slightly below the cricoid, the neck should at once be opened, under a general anæsthetic, in order to expose and drain the seat of injury. If, on the other hand, the injury affects the thoracic or abdominal œsophagus, it is beyond repair.

These facts emphasize the teaching of gentleness and patience in practising œsophagoscopy. (See also under Cicatricial Stricture, p. 218.)

Sounding the Œsophagus.—In addition to œsophagoscopy, we can frequently obtain some information by passing an œsophageal bougie.

When suspicion of stricture is aroused (when the history tells of the arrest and maybe regurgitation of food from the gullet after swallowing), the œsophageal bougie may be used to ascertain whether or not the calibre of the tube is organically narrowed. A bougie 14 millimetres in diameter should pass easily, otherwise there is stenosis. If, when the bougie is *in situ* in cases of stenosis, the point on the instrument corresponding to the incisor teeth be marked, and the distance of this point from the end of the bougie measured after withdrawal, the approximate site of the constriction in the gullet will be discovered.

In passing the bougie, after having smeared it with glycerine or vaseline and bent it slightly near the end, one carries the point of the instrument to the back of the pharynx, and, under the guidance of the left finger in the pharynx, pushes it down and rather to the left with a steady, sweeping movement. Arrest by muscular contraction is common at the upper constriction, but the spasm soon passes away if no attempt be made to force the instrument onward. On withdrawing the instrument, note if there is blood or other discharge on the tip.

The bougie, being formed of gum-elastic, is less apt to damage the œsophageal wall than is the rigid tube. But *it should never be used if there is any suspicion of a foreign body* in the œsophagus. It is advisable also to have the patient X-rayed before proceeding to examine the œsophagus by any of the above methods, save, perhaps, in recent cases of foreign body, where time is of value.

AFFECTIONS OF THE ŒSOPHAGUS

Malformations.—**Congenital** communication between the œsophagus and trachea is occasionally found. Its presence is, of course, incompatible with life, and children born with the deformity die in a few weeks.

A case of **Congenital Atresia** has been reported by J. S. Hirsch ('Journ. Amer. Med. Assoc.,' vol. lxxvi, No. 22, May 28th, 1921).

The infant regurgitated from birth everything taken by the mouth. Meconium only was voided from the bowel.

The necropsy showed the œsophagus patent as far as the fourth thoracic vertebra, where it ended blindly in a dilated pouch. Thence it was continued as a fibrous band to within an inch of the stomach, where it again became a patent tube.

This variety is said to be rarer than the former.

Acquired Malformations.—**Traction Diverticula**, which are very rare, are due to cicatricial adhesion of the wall of the œsophagus to a bronchial

gland, and so occur about the bifurcation of the trachea. They are seldom recognized during life.

Œsophagitis and Œsophageal Abscess.—Compared with the rest of the alimentary canal, the œsophagus is rarely the seat of inflammation. When it does occur, it is almost invariably due either to the action of corrosive liquids or to the trauma produced by a foreign body. (We shall exclude from our consideration the rare and fatal phlegmonous œsophagitis, and, for the moment, the œsophagitis and ulceration above a stricture. (See p. 220.)

Strong Acids and Alkalis may be swallowed with suicidal intent or by accident, as in the swallowing of lye by children so common in America. In passing down the œsophagus they cauterize and destroy more or less of its wall, sometimes in a curiously haphazard fashion, though more frequently it is at the constrictions that most damage is done. The depth of destruction depends largely upon the potency of the liquid.

The immediate *symptoms* are an intense, burning pain, dysphagia, thirst, and shock. The lips, tongue and pharynx are also cauterized. Should the œsophageal wall be penetrated death quickly follows.

If the patient survives, the slowly healing wounds and ulcers frequently end in a fibrous stricture. (See p. 218.)

Treatment.—The corrosive liquid should be neutralized. Thus acids are counteracted with weak alkalis, such as bicarbonate of soda, and caustic alkalis with dilute vinegar. In both, oil and other emollients may be given. Shock is met with warmth and general stimulants administered hypodermically.

Œsophagitis from Foreign Bodies.—The sojourn of a hard foreign body impacted in the œsophagus sets up local swelling and ulceration, which disappear when the body is removed. Should removal be delayed, sloughing may be induced and œsophageal abscess or deep cervical cellulitis may result. The same sequelæ follow the penetration of the wall by a sharp foreign body like a pin or a fish-bone. (See Fig. 92.)

Œsophageal Abscess occurs only in the upper third of the gullet, not only because this is the most usual site of arrest of foreign bodies, but also because at a lower level before abscess has time to form septic mediastinitis kills the patient.

Several varieties of abscess are described. The *submucous* type need not detain us, as it ruptures spontaneously into the œsophagus.

Intramural Abscess, almost invariably the result of a foreign body, forms between the muscular and the outer fibrous walls. It usually affects the posterior wall, but may spread laterally, and, at times, becomes a collection of considerable size. A fistulous opening, the track left by the foreign body, frequently leads into the œsophagus, and through it a certain amount of pus is discharged. If neglected it may heal spontaneously; rupture into the deep cervical planes; or gravitate into the mediastinum.

1. *Symptoms.*—Dysphagia is the prominent symptom, and it may be so

severe as to prohibit swallowing. The breath becomes fœtid and the tongue is thickly coated, but pyrexia and other constitutional symptoms are mild, probably because the abscess possesses a vent through which the pus leaks. Œsophagoscopy shows a closure of the lumen of the gullet by red, inflamed walls, and the fistulous track may be detected.

Treatment.—The foreign body having been removed (but see also p. 227), the abscess is evacuated into the œsophagus through the direct tube either by enlarging the fistula with forceps, or, if the fistula cannot be found, by incision of the œsophageal wall. As the pus-collection is sometimes large, Guisez, who has operated successfully on twelve of those cases, warns us to operate with the patient supine and the head lowered, in order to prevent the entrance of pus into the larynx and air-passages.

Deep Cervical Cellulitis is caused by a septic invasion of the neck beneath the deep cervical fascia. It may follow external operations when drainage is neglected (see p. 654), but it also results from the penetration from within of the œsophageal wall. The infection sets up a spreading cellulitis, which differs from an abscess in being unconfined. It is marked by the formation of thin sero-pus and by severe toxæmia, and, if unrelieved by external operation, ends in mediastinitis and death.

Symptoms.—In addition to the general toxæmia, manifested in a swinging temperature, small rapid pulse and grave asthenia, the neck over the affected region is slightly swollen and pits on deep pressure. But there is no reddening of the skin and tenderness may only be slight. Sometimes pain attends movements of the head, and some rigidity of the neck may be present.

Treatment.—On the more swollen side of the neck an incision is made along the anterior border of the sterno-mastoid from the upper border of the thyroid cartilage to the episternal notch, and carried down through the superficial layer of the deep cervical fascia. Through this opening and medial to the great vessels a pair of closed dressing-forceps is thrust on a level with the cricoid cartilage about as far as the œsophagus. A gush of thin, fœtid pus will indicate the opening of the infected area. A large drainage-tube should be inserted.

Only if the diagnosis is promptly made and the operation successfully accomplished can the patient be rescued.

Local **ulceration** of the œsophagus may result from impacted foreign bodies, or from such diseases as epithelioma. (See p. 222.)

Varix of the veins of the lower end of the œsophagus, an occasional source of fatal hæmatemesis, is found in cases of cirrhosis of the liver.

At this situation also occurs the rare **peptic ulcer** of the œsophagus, which, like gastric or duodenal ulcer, has a tendency to perforate. It is commoner in males than females, and, like duodenal ulcer, is a disease of middle life.

The *symptoms* are pain at the lower end of the sternum and between the shoulders, with vomiting and sometimes dysphagia from reflex œsophageal spasm—a feature which distinguishes it from peptic ulcer of the stomach.

Treatment.—The ulcer is treated by the local application through the œsophagoscope of silver nitrate, bismuth or other astringents.

Rupture of the Œsophagus.—Excluding direct traumatism, rupture of the œsophagus has been known to result from violent vomiting. It is predisposed to by the presence of an ulcer, or by weakness of the walls from severe constitutional disease. The tear is longitudinal and on the posterior wall of the lower third. It occasions intense local pain, dyspnoea and collapse, and is rapidly fatal.

STRICTURE OF THE ŒSOPHAGUS

Stricture of the œsophagus may be due to disease of the œsophagus, or to the pressure of tumours, goitre, aneurysm, etc., situated external to the œsophagus. Of the former there are three varieties :

1. Spasmodic stricture ; and
2. Organic stricture, which in turn is divided into—
 - (a) Fibrous, and
 - (b) Malignant stricture.

Spasmodic Stricture, although perhaps most common in women, affects also men, and it may occur—indeed it frequently makes its first appearance—in infancy. And, in addition to spasmodic stricture from some neurotic cause, spasm nearly always accompanies irritation of the œsophagus, as from inflammation, ulceration, malignant disease or a foreign body. For that reason, as Hill has pointed out, we should be careful to exclude organic disease before diagnosing the case as one of functional stricture. Furthermore, spasmodic stricture of the œsophagus, even of the upper part, may be an early symptom of gastric cancer.

Three varieties are described according to the location of the stricture.

1. *Post-Cricoid Stricture*, which is, in reality, a spasm of the lower fibres of the inferior constrictor of the pharynx rather

than a spasm of the œsophagus. induces a difficulty in swallowing which the patient usually refers to the throat. In cases seen by the writer, the difficulty attended every meal, and frequently necessitated rising from table to regurgitate. It may last for many years, but the patient is usually able to get enough nourishment down to prevent serious emaciation.



FIG. 84. —Spasmodic Stricture of Œsophagus in Mid-thorax. Cured by suggestion. (Skiagram by Dr. Robert Knox.)

Œsophagoscopy shows the post-cricoid or pharyngo-œsophageal lumen reduced to a diameter of 3 to 5 mm., and looking as if a thread were tied under the mucosa. Examination with X-rays and screen shows the bismuth meal delayed in the post-cricoid region.

Treatment by passage of the bougie through the œsophageal tube is followed by immediate cure, but the stricture may recur from time to time, and require another passage of the sound.

2. *Intra-thoracic Spasmodic Stricture* causes similar symptoms, but the stricture varies from time to time in tightness, coming and going capriciously, sometimes being so tight as to arrest even liquids, at other times being quite absent. (Fig. 84.)

The bougie also leads to the cure of this variety.

3. **Cardiospasm.** (*Spasmodic Stricture of the Cardiac End of the Œsophagus ; Achalasia of the Cardia.*) (Fig. 85.)—The stricture known by these several names is by no means uncommon ; A. J. Walton has found seven instances out of 8332 necropsies ('Brit. Journ. Surg.,' vol. xiii, p. 332.)

The condition has given rise to much discussion, at least three different explanations being offered for its occurrence.

The first ascribes it to paresis or paralysis of the vagus, probably functional in nature. When the vagus is stimulated, the œsophagus, in its course from above downwards, undergoes contraction, while the cardiac sphincter opens, this being the normal movement of the œsophageal wall. On the other hand, it has been shown by experiment that, when the vagus is divided, the œsophagus as a whole dilates, while the cardiac end remains tightly closed. Now in the condition we are discussing there is a stricture, probably muscular, at the lower end of the œsophagus, while the gullet above is dilated, sometimes so enormously as to rival in capacity the stomach itself. (Fig. 85.) Moreover, the stricture cannot be found after death,



FIG. 85.—Œsophagus showing Dilatation from Achalasia (Cardiospasm). (From specimen in University College Museum.)

and sometimes also it disappears during anæsthesia, and, in its earlier stages before secondary changes set in, it offers no obstacle to the passage of a bougie. That being so, Hurst gave to it the name "achalasia" (absence of dilatation) "of the cardia."

On the other hand, Hill points out that the narrowing is situated not exactly at the cardiac end of the œsophagus, but rather at its passage through the diaphragm, and he therefore regards the obstruction as induced by irregular action of the diaphragmatic crura, whereby the gullet is compressed from without at the moment when it ought to be opening.

A third suggestion is that the obstruction is caused by a kink in the lower end of the œsophagus, and in favour of this view is the reported observation that the œsophagus in these cases seems to be abnormally long.

Whatever the cause may be, the clinical features in this, the most serious of the neuroses of the œsophagus, are distinctive. It behaves during life more like an organic than a functional disorder. There is a definite stricture which, although it may come and go, usually persists for a prolonged period, it may be for many years, with variations in severity no doubt, but often with a gradual tendency to become worse. This may be due to the fact that in the long course of time ulcers form about the lower orifice of the dilated œsophagus, and, becoming cicatrized, transform the functional into an organic, a fibrous stricture.

Symptoms.—As a rule the difficulty in getting food down, the seat of which the patient usually locates at the lower end of the gullet, but which he may refer to the cricoid region, comes on gradually, and the patient may put up with his discomfort for several years before consulting a doctor. That is the reason, perhaps, why the average age of patients seeking relief for this complaint is so advanced—52 years according to Walton. For it would seem that the disability is not infrequently dated back to early manhood, and even to childhood. Sometimes, however, the onset is abrupt.

In either case, more or less constant partial obstruction is experienced, when only semi-solids and liquids are able to pass. As time passes and the œsophagus becomes dilated, it retains quite large quantities of food and liquid, and then the patient suffers much discomfort and even pain, until he learns to relieve himself by regurgitation.

Occasionally imperfectly masticated pieces of meat, etc., become impacted in the narrow lumen and absolute obstruction is produced. Sometimes it is spontaneously relieved; sometimes not. Repetitions of such blocks are not uncommon, and I have known patients so accustomed to them that they have come simply to have the obstacle removed and have declined further treatment.

The long continuance of such disabilities ultimately leads to some loss of weight and even to serious emaciation. But this development is often delayed, as a certain amount of nourishment generally succeeds in getting through.

X-Ray Examination, with the barium meal, gives a typical picture in

the large shadow of the dilated œsophagus. If the stricture is permeable a further streak will show its situation. (Fig. 86.)

The œsophagoscope, when passed, plunges into a well of dirty liquid with pieces of food floating about in it. This should be evacuated by inverting the patient with the tube *in situ*, as aspiration is impeded by the solid masses in the liquid. Then a search can be made for the lower opening. In most it will appear as a small puckered recess or dimple at the lower end of the dilated gullet, although sometimes, as Brown-Kelly points out, it lies on the left lateral wall a little above the fundus of the sac.

Diagnosis.—Cardiospasm, so long as it is spasmodic at all events,



FIG. 86.—Stricture of the Cardiac End (Achalasia) of the Œsophagus, with dilatation above. (Skiagram by Dr. Robert Knox.)

differs from fibrous stricture in presenting no obstacle to the passage of bougies. It may also be seen contracting and dilating as the end of the œsophagoscope approaches and recedes from it (Brown-Kelly).

From malignant stricture it is distinguished by presenting a smoothly puckered mucosa free from sprouting granulations and infiltration.

Prognosis.—As we have already said, cardiospasm is a chronic, persistent complaint. Nevertheless, if treated in the early stage, long-continued relief and even cure may be obtained by simple bougieing. At the same time, it must be admitted that there are many cases difficult of cure, and in these death may ensue as a result of semi-starvation or, it may be, of the occurrence of absolute obstruction.

Treatment.—In the milder cases gradual dilatation of the stricture by

bougies may lead to cure. There are many patterns of bougie on the market, some of solid gum-elastic, others with olive-shaped ends. Hirsch's mercury-containing hollow rubber bougies are also widely used. A small bougie is passed, followed by larger sizes to the limit of the patient's tolerance, the largest size being left *in situ* for an hour or two. If not permanently cured the patient can return for another dilatation as the necessity arises. Sometimes he can be trusted to pass the bougies himself.

It is to be remarked, however, that the use of the bougie is not always free from danger. If, for example, the lower orifice is situated on the lateral wall of the œsophagus and the bougie is incautiously pushed on, it may tear through the thin, friable fundus of the dilated gullet.

In the more advanced cases, where presumably fibrosis is present, the bougie is insufficient, and *stretching* of the stricture is called for. For this purpose hydrostatic pressure is employed.

The distance of the stricture from the incisor teeth having been ascertained, a mark corresponding to the measurement is made on the water-tube, and it is then passed, usually without difficulty, until the mark shows that the bag at the end is engaged in the stricture. It is then gradually filled with water under pressure until the patient feels it uncomfortable. Then, after a time, it is emptied and withdrawn.

If there is *total obstruction* of brief standing, the œsophagoscope is passed and a search made for the impacted morsel, which, on discovery, is removed by forceps, or simply pushed on into the stomach.

If, however, total obstruction has been in existence for several days and the patient is suffering from "water hunger," endoscopy is contra-indicated until gastrostomy has been performed and the deficiency of liquid in the body made good. (See p. 220.)

Stenosis from Hypertrophy of the Cardiac Sphincter.—Only two cases of this condition seem to have been recorded so far. (Brown-Kelly, 'Proc. Roy. Soc. Med.,' Laryng. Sect., vol. xiii, p. 206.)

The symptoms resemble those of cardiospasm, but hypertrophic stricture differs from the commoner form of stricture in presenting an obstacle to the passage of bougies.

Necropsy in Brown-Kelly's cases showed hypertrophy of the muscle surrounding the abdominal œsophagus (the "cardiac canal" of Shattock) and also part of the stomach. It seems to be a condition analogous to hypertrophic stenosis of the pylorus.

Cicatricial Stricture (Fibrous Stricture) (see Fig. 87) may form in any part of the gullet, and there is some divergence of opinion as to its commonest situation. The swallowing of a corrosive poison is perhaps the most frequent cause, but it may also result from the ulceration produced by a foreign body; from syphilitic disease; and from the abrasion and the ulceration consequent upon spasmodic stricture. Finally, a fibrous stricture may form without any obvious cause.



FIG. 87.—Tongue, Larynx, Œsophagus and Stomach of an Infant, showing cicatricial stricture of the œsophagus induced by a corrosive poison. Note the dilatation of the œsophagus above the stricture.

Symptoms.—The symptoms arising from fibrous stricture tend to become progressive, and to lead to absolute obstruction and death. The history is that of painless difficulty in the swallowing, first of solids and later of liquids. Periodical attacks of absolute obstruction from the impaction of unchewed food or of substances such as pills or tabloids are common,



FIG. 88.—Skiagram (by Dr. H. Graham Hodgson) of Cicatricial Stricture of the Œsophagus, showing Dilatation above the Stricture.

but the patient soon learns to relieve himself of such attacks when they set in, by movement of regurgitation or by the induction of vomiting.

As in cardiospasm, the œsophagus above the stricture undergoes dilatation, and in this sac the food collects, regurgitating after a time. Attacks of inflammation and ulceration are common, as in the cicatricial strictures of other canals, and may also lead to absolute obstruction.

When *absolute obstruction of the œsophagus* is set up, from whatever cause arising, the immediate peril to the patient arises less from want of nourishment than from want of liquid—the so-called “*water-hunger*.” In this state, which appears in from three to six days after the onset of

complete blockage, the patient is in a dangerously weak condition, and all examination should be suspended until the urgency is relieved. In order to do so, gastrostomy should at once be performed, and water given by the artificial opening. In the meantime, normal saline solution should be given *per rectum* and subcutaneously, but these measures should only be considered as supplementary to the gastrostomy.

When the water-hunger is relieved, and not till then, the œsophagoscope may be passed, and the œsophagus examined.

The first task may be to empty the dilatation above the stricture of the food, solid and liquid, within it. This can be done by means of a long aspirator passed into the dilatation through the direct tube, or better, by inverting the patient while the tube is in the œsophagus and then removing the more solid material with forceps. The stricture then becomes visible as a puckered or dimpled point, around which the mucosa is often red, swollen and ulcerated, bleeding readily when touched.

Diagnosis.—If the stricture be situated at the cardiac end it can only be distinguished from cardiospasm by the results of treatment. The latter, when simple, is at once cured by dilatation, while the former is much more obstinate.

Compression of the gullet from without is distinguished from stricture by its being linear or crescentic, whereas the stricture shows as a puckered orifice. The mucosa also in compression is smooth and uncongested.

From malignant disease fibrous stricture is usually easily distinguished on œsophagoscopic examination by its smoother upper orifice and by the absence of fungating masses.

Prognosis.—Cicatricial stricture of the œsophagus tends to become absolute, and to cause death, but the results of treatment are good if the patient can be brought under control before the onset of water-hunger, that state being one of immediate peril.

Treatment.—Having brought the patient within the limits of safety as directed above, the next step is to give the œsophagus rest, so as to reduce local swelling and inflammation. Nothing is given by the mouth save a little bismuth, and the patient is kept in bed.

In a few days we may proceed to dilate up the stricture by means of bougies. If it is very fine, Chevalier Jackson's filiform bougies are used, being passed through the stricture by gentle continuous pressure. Previous to the operation the patient swallows some olive oil as a lubricant. Once passed the bougie is allowed to remain *in situ*, and then, using it as a guide, larger bougies are passed until the patient is able to swallow well-chewed food.

The gastrostomy opening may then be closed. But the patient should be examined once a month, and every indication of tightening of the stricture met by timely treatment. At home, the patient himself may keep the lumen from closing by passing a bougie from time to time.

Ulcers about the aperture are best treated by the local application of a strong solution of silver nitrate.

The most difficult and troublesome strictures are those which are multiple, and much patience is required for their negotiation.

In the lye cauterizations of the œsophagus, so common in America, if the case is got early, the formation of stricture should be prevented by beginning the use of the bougies as soon as the burn is healed, and by continuing them regularly for years.

Impermeable Stricture of the cervical œsophagus may be treated by œsophagotomy, excision, and the turning in of a skin-flap as in œsophagotomy for cancer. (See p. 165.) If the impermeable stricture is situated in the thoracic œsophagus, gastrostomy is the only available measure. If it is situated in the lower third, it may be divided through a gastrostomy opening by the surgeon cutting on to the end of the œsophagoscope passed from above, the lumen being maintained until healed by tubes and later by regular bouginage. (Chevalier Jackson.)

CANCER OF THE ŒSOPHAGUS

(Malignant Stricture of the Œsophagus)

(For post-cricoid cancer see p. 78.)

Cancer of the œsophagus may commence at the pharyngeal end, at the middle, or at the gastric end, but it is most frequent in the middle third. It is the commonest of all affections of the œsophagus. The growth, which is epitheliomatous, grows round to involve the whole circumference of the tube and so induces stricture. But cases occur, nevertheless, in which it is chiefly confined to one side. Generally speaking, although stricture is usual, complete obstruction is rare, and dilatation of the gullet with œsophageal vomiting is seldom encountered.

Malignant disease appearing at the cardia is frequently gastric in origin.

It causes death by starvation or by extension to neighbouring structures and organs, such as the large blood-vessels, the trachea or the pleural cavities.

Symptoms.—The patients are usually men over fifty, the youngest case being fourteen, the oldest eighty. (Guisez, 'Bullet. d'Oto-Rhino.-Lar.,' May, 1920.) In contrast with post-cricoid cancer, it is commoner in males. (See p. 78.) The first symptom to appear is usually a painless difficulty in swallowing, and although of gradual onset as a rule, the earliest intimation of the presence of the disease may be the sudden onset of complete obstruction. When progress is more gradual, the dysphagia is associated with progressive emaciation. Cough after attempted swallowing, with, sometimes, pain referred to the seat of the disease, is frequently present.

Enlarged cervical glands may be palpable at the root of the neck, and they are sometimes found before any suspicion has arisen that the disease is œsophageal, as when, for example, a patient comes complaining of hoarseness which laryngoscopic examination shows to be due to recurrent

paralysis. In such a case the presence of hard, enlarged glands at the root of the neck would indicate cancer of the œsophagus.

If there is regurgitation of food after swallowing, the presence of blood in the regurgitated matter would also raise suspicion of cancer.

Sometimes dysphagia is absent and the symptoms may be those of painful dyspepsia, or of some interference with the bronchi or lungs—dyspnœa, cough and expectoration. Sometimes, also, the disease is entirely latent until a large vessel is ulcerated into and sudden death from hæmorrhage takes place.

The symptoms of the terminal stages depend upon the nature of the treatment, and on the direction taken by the infiltrating disease.

Examination.—Before examination with the direct tube is undertaken an X-ray examination with barium should be made, in order to determine the exact level and extent of the obstruction.

Œsophagoscopy should only be undertaken with the precautions outlined above (see p. 209), and no attempt should be made to force the tube through the stricture, as the cancerous œsophageal wall is extremely friable.

The appearances are those of stricture, with infiltration, ulceration and fungation of the mucosa. Gentle pressure by the end of the tube is sufficient to cause bleeding, and the bright-red masses of cancerous fungations are, as a rule, sufficiently distinctive. If necessary, a portion may be removed for microscopic examination.

The *diagnosis* may be difficult if dysphagia is absent. From cicatricial stenosis it is distinguished by the history, and by the œsophagoscopic appearances. When situated at the cardiac end it is differentiated from cardiospasm by the short history, the absence of dilatation and the œsophagoscopic examination.

Treatment.—The only method we can adopt for carcinoma lower than the cricoid level is to apply *radium*, and, as experience shows, this is only a palliative remedy, although Guisez reports three cases of apparent cure from its use.

Method.—A suitably screened tube containing 150 mgrm. of radium bromide, or its equivalent in radium emanation, attached to a flexible wire, is passed through the œsophagoscope into the lumen of the gullet at the seat of the growth, and left there from eight to twelve hours. The patient, meantime, is kept in bed, under morphia, and is given rectal salines.

W. Hill ('Journ. of Laryng.,' vol. xl, p. 73) insists that the whole extent of the cancerous stricture should be irradiated. For that purpose exact measurements of the stricture must be made. If it is long, several applications may be required. It may be necessary to dilate the



FIG. 89.—Souttar's Œsophageal Tube.

stricture sufficiently to allow the radium tube to be inserted. A repetition dose should be given six weeks after the first irradiation. Hill's time dose is equivalent to fifteen hours of 150 mgrm. of radium.

Results.—Of 77 cases treated in this way, one-third showed improvement; one-third slight improvement; and one-third no improvement; in three, death occurred a few days after the application. Guisez also

reports improvement in most cases, and in "several" life was prolonged for from eighteen months to eleven years.

Intubation.—If radium fails or cannot be applied, life may sometimes be prolonged by the use of œsophageal tubes inserted into and through the stricture so as to remedy the obstruction. Three varieties are available: Symond's, which are short and made of gum-elastic; Souttar's (Fig. 89), also short and made of coiled wire; and Hill's, which is a long, catheter-like tube with a vulcanite point and a flexible metal stylet.

Souttar ('Brit. Med. Journ.,' May 3rd, 1924, p. 782) first of all dilates up the stricture with bougies—a procedure not entirely free from danger—and, when it is wide enough, inserts the tube and leaves it in position. Mastication and deglutition are carried on normally, and the relief to swallowing may enable the patient to put on weight. The tube, however, is not always well tolerated.

Hill's tube (Fig. 90), being of fine calibre, can be inserted without dilating the stricture. Nourishment, in liquid form only, must be given through the tube; sometimes, however, its presence facilitates normal swallowing. The tube should be removed and replaced by a new one every fortnight, as the rubber soon perishes.

Tubes obviate the necessity for gastrostomy, but if they cannot be worn that operation becomes necessary. In any case it should not be too long delayed, for if it

is performed upon a patient weak for want of food it only succeeds in inflicting the *coup de grâce*.

Of other palliative measures, tracheotomy may be mentioned as necessary if the growth induces respiratory obstruction.

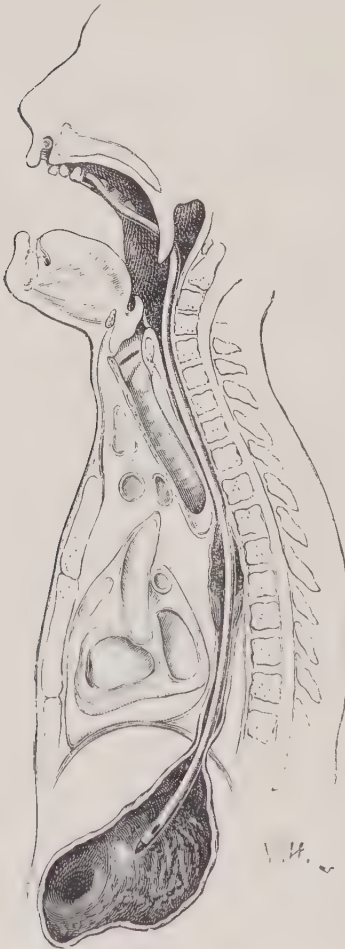


FIG. 90.—Hill's Feeding-Tube.

FOREIGN BODIES IN THE ŒSOPHAGUS

The variety of foreign bodies arrested in the œsophagus ranges from bones to coins, from artificial tooth-plates to open safety-pins. And all these can as a rule be removed by the direct method, in most cases without endangering the patient's life.

The danger of a foreign body in the œsophagus is seldom so immediate as when the air-passages are the seat of lodgment, as there is rarely any risk of asphyxia from obstruction to respiration. The risk is not unknown, however, as a bulky object in the œsophagus may cause tracheal stenosis by its bulging into the tracheal lumen. But such an occurrence is exceedingly rare.

On the other hand, however, the local effects of a foreign body in the œsophagus, if it is allowed to remain there, are liable to be more immediately serious than those of a foreign body in the air-passages. The effects in both cases vary, of course, according to the kind of body present, but in the bronchi, if the foreign body does not interfere with respiration or induce acute septic infection, it may only lead to a slow ulceration of the lung with the formation of a bronchiectatic cavity—a very disagreeable but not a dangerous malady. In the œsophagus, on the other hand, ulceration, if it occurs, is apt to end in rupture of the wall and fatal mediastinitis. Cases, no doubt, have been recorded of the lodgment in the gullet for many years of even such hard foreign bodies as tooth-plates, with successful removal at last by the direct method. But this kind of tolerance is very exceptional. So that although a foreign body in the œsophagus may not be so instantaneously dangerous as a foreign body in the trachea or bronchi, the period of immunity from evil consequences is not a long one, and the sooner the patient is relieved of the intruder the better. These considerations apply with particular force to sharp bodies like pointed bones, tooth-plates with hooks, etc.

Symptoms.—The patient is aware of a lump in the throat or chest, and he generally is quite clear that the lump felt is a foreign body, which he is sure he has swallowed.

It is a rule always to accept the patient's word that a foreign body has been swallowed.

Pain, also, is almost always present, not only during deglutition, but as a constant feature. It is worst when the foreign body is situated in the post-cricoid region and then it is often aggravated by phonation. (Thos. Guthrie, 'Journ. Laryng.', vol. xxxviii, p. 229.)

Dysphagia, both from pain and from mechanical interference with the movements of the œsophageal wall, is also almost invariable, and in the case of sharp bodies may be so pronounced that the patient abstains from swallowing altogether.

As a rule the patient's sensations enable him to indicate the situation of the foreign body with accuracy.

The usual site of arrest is above or within the lower pharyngeal sphincter just at or above the upper end of the gullet, but a foreign body may be held up anywhere in the œsophagus.



FIG. 91.—Tooth-plate Impacted in the Œsophagus. (Skiagram by Dr. C. Thurstan Holland.)

Direct examination, as in other forms of œsophageal obstruction, should be preceded by an X-ray examination. When the body is opaque it will of course show upon the plate. (Fig. 91.) But even when it is transparent radioscopy will disclose its situation, as its interference with œsophageal movement causes a characteristic hesitation in the descent of the barium mixture, which is plainly visible on screen examination.

Prognosis is grave until the foreign body is removed and its effects disappear.

Treatment.—**Bougies should not be used. Probangs should not be used. Coin-catchers should not be used.** Because the danger to life from such instruments is greater than the danger from the foreign body.

The direct tube, as large a size as possible, having been passed down to the foreign body, the latter is seized with suitable forceps, disengaged and removed. The manœuvre may be successfully carried out under local anæsthesia, although many operators prefer general anæsthesia, and in simple cases it takes up very little time. It is often a less delicate operation than bronchoscopy for a foreign body.

When, however, the body presents sharp pointed ends or hooks, the problem of extraction becomes difficult. From this the common sense and resourcefulness of the operator must deliver him, as rules cannot be given to apply to every kind of object.

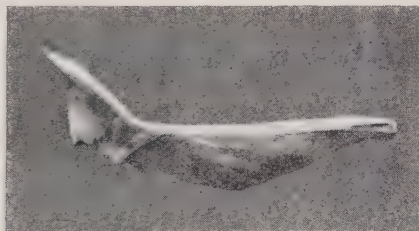


FIG. 92.—Pointed Foreign Body (Fish-bone) successfully removed by the author from the œsophagus, across the lumen of which it was lying. Natural size.

Sharp bodies impacted across the lumen should be seized by one end, never by the middle. (See Fig. 92.)

Open safety pins, with the point upwards, should *never be pulled out*. Chevalier Jackson's method of conveying them open to the stomach and there turning them point downward should be tried, or one of the ingenious forceps devised for closing these pins may be employed. Perhaps the most difficult objects are tooth-plates, the hooks of which have caught in the wall of the œsophagus. But these bodies may be cut in two and extracted by means of Irwin Moore's strong forceps. (Fig. 93.)

If a foreign body is situated in the cervical œsophagus and efforts at *direct extraction* have *failed*, œsophagotomy should be performed without delay.

In similar circumstances, with the foreign body in the lower thoracic œsophagus, gastrostomy should be performed and an effort made, with the fingers passed into the œsophagus from below, to extract it.

Bodies situated between the fifth and the eighth dorsal vertebræ, too low to be reached through an œsophagotomy opening and too high to be reached through a gastrostomy opening, may sometimes be

pushed into the stomach (if not sharp), and either left there or removed by gastrostomy.

Chevalier Jackson warns us that if a sharp foreign body reaches the

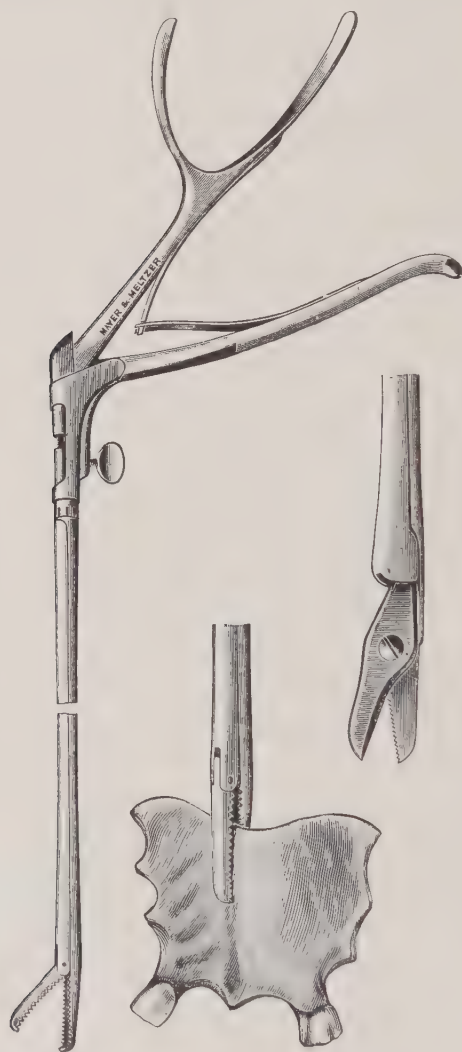


FIG. 93.—Irwin Moore's Strong Forceps for foreign bodies in the œsophagus; also the Cutting Forceps.

stomach the patient should be kept under observation until it has passed *per anum*.

The *danger* from the presence of foreign body in the gullet, and from the manipulations needed to extract it, consists in the ease with which the soft wall of the œsophagus can be torn or penetrated.

Perforation of the œsophageal wall manifests itself in an increase in pain and in the onset of serious septic phenomena, local or general, or both.

In the cervical region the signs of œsophageal abscess or deep cervical cellulitis appear. (See p. 212). Sometimes surgical emphysema can be detected—an important discovery from the diagnostic point of view.

In the thorax perforation of the œsophagus is a fatal accident, as it is followed by septic mediastinitis. Important vessels or organs may be injured.

Treatment.—If perforation has taken place, nothing can be done unless the site of the rupture is in the cervical portion of the gullet, in which case an external operation should at once be undertaken, œsophagotomy performed and the wound drained. If the foreign body has not been removed, that also should be done through the external opening without any effort being made to remove it by the endoscope. (See also p. 213.)

If a foreign body has set up local œsophagitis, with ulceration or sloughing, attempts at removal may lead to perforation. In that case, it is best to temporize. The patient is kept in bed and given liquids *per rectum*. All swallowing is forbidden, with the exception of regular doses of bismuth and a little calomel. Under this treatment the œsophagitis often subsides and removal can then be undertaken with less risk.

œsophagotomy for Foreign Body.—Unless the foreign body can be felt bulging on the right side of the neck the operation is performed on the *left* side.

The shoulders of the patient are raised, the head extended and turned to the opposite side. An incision is made 3 inches long along the anterior border of the sterno-mastoid, from the level of the upper border of the thyroid cartilage downward. The skin, platysma and superficial layer of the deep fascia having been divided, the wound is deepened along the anterior border of the sterno-mastoid until the omo-hyoid muscle crossing the wound upwards becomes visible. This muscle is cleared and drawn down or divided.

The foreign body may be palpable in the wound. The sterno-mastoid along with the carotid sheath is drawn out, and the sterno-hyoid and thyroid muscles are divided if necessary. The larynx and trachea are now tilted well over to the opposite side. Clearing the space further by blunt dissection reveals the inferior thyroid artery and the middle and inferior thyroid veins, which should be divided between the ligatures. The œsophagus is now visible, and should be opened longitudinally on the foreign body, the incision being made as far back as possible, so as to avoid the recurrent laryngeal nerve. The actual removal of the impacted foreign body calls for gentle handling; all tearing and force must be avoided.

The operation completed, the œsophageal wound is tightly sutured, and a feeding-tube passed through the nose into the œsophagus past the wound

and left for ten days. The wound in the neck should only be partially sutured, ample provision being made for drainage.

Results.—(See Irwin Moore, 'Proc. Roy. Soc. Med.,' Laryng. Sect., vol. xii, p. 14.)

Of 60 foreign bodies in the œsophagus reported between 1908 and 1918, 47 were successfully removed by œsophagoscopy; 5 were released, 2 of them being vomited and 3 passing *per anum*. One was removed by œsophagotomy. There were 7 deaths, 2 of which were due to blind bougieing.

As the same statistics record only 2 deaths from foreign bodies in the bronchi and lungs out of 39 cases (see p. 209), a foreign body in the œsophagus is apparently the more dangerous of these two accidents.

CHAPTER VII

EXAMINATION OF THE NOSE AND NASO-PHARYNX AND GENERAL THERAPY OF THE NOSE

FIRST of all, inspect the outside of the nose, noting the shape of the bridge, the appearance of the skin, etc. The interior of the vestibule is examined before using the speculum by tilting upward the tip of the nose by means of the thumb of the left hand. Note the movements of the alæ in respiration. In embarrassed breathing, especially in children, the alæ may be seen widely dilating with each inspiration. The opposite condition, a collapse of the alæ, may be observed in long-standing nasal obstruction.

Note the condition of the upper lip, excoriation and thickening of which are common in children with nasal discharges. Inspect also the eyelids, the eyes, and the eyebrows. The inner angle of the roof of the orbit should be palpated by the finger placed deeply in this angle and pressed upwards in the direction of the frontal sinus. Any swelling or fullness felt in this situation must be noted as possible evidence of frontal sinus disease.

Tapping the bone of the inner quarter of the supra-orbital ridge with the finger, as if percussing, will often elicit a complaint of pain on one or other side in cases of frontal sinusitis. The occurrence of epiphora from blocking of the nasal duct is not infrequently due to nasal disease.

The skin of the nose and vestibule may be eczematous, or the seat of acne, impetigo, herpes, lupus vulgaris, or lupus erythematoses. While the shape of the bridge varies much in different individuals, a marked irregularity in outline indicates a deviated septum or a "broken nose" from traumatism. Depression of the bridge is found in fractures and perforations of the bony septum. An abnormally broad bridge may be caused by a large middle turbinal bone, or may have resulted from distension of the middle meatus of the nose by polypoid growths.

In atrophic rhinitis a little transverse depression or dimple is frequently to be seen on the bridge about the level of the upper border of the triangular cartilage, and at the same time a certain degree of tilting upwards of the point of the nose is often present.

After the external examination is completed, proceed to investigate the interior of the nose by means of a speculum. The speculum generally used at the Central London Throat and Ear Hospital is the pattern introduced by Lennox Browne, which will be found the most useful for all purposes. (Fig. 94.) Holding the speculum in the left hand, and under direct illumination

from your forehead-mirror, pass the closed speculum into the nostril. Steady your left hand by resting the little finger on the bridge of the patient's nose, and gently separate the blades of the speculum. Do not introduce the blades beyond the vestibule or their opening will cause pain. Do not insert it too timidly or the vibrissæ will interfere with your view. (Sometimes it is necessary to clip these hairs.) Remember that the floor of the nasal cavity is considerably higher than the outer level of the nostril.



FIG. 94.—Lennox Browne's Nasal Speculum.

The first object which attracts the attention after opening the speculum is the anterior end of the *inferior turbinal body*, a red, rounded, smooth, glistening object, attached to the outer wall of the nose, and normally separated by an interval from the septum, which occupies the middle line. Observe the size of this portion of the inferior turbinal, whether it fills the inferior meatus, or is in contact with the septum. Note its colour—red or pale; and its surface—whether smooth, granular, or lobulated. By asking the patient to lower his head slightly, so as to render the floor of the nose more horizontal, you will be able, when the inferior turbinal is normal or atrophied, to follow its contour backwards towards the naso-pharynx, and, in certain cases, the red light-reflex from the posterior pharyngeal wall will be visible. Note the condition of the body, and, as far as possible, the posterior end of the turbinal. Any *synechiæ* or adhesions between the inferior turbinal



FIG. 95.—The Nasal Outline.

and the septum, forming bridges across the inferior meatus, and often causing marked obstruction, should be noted. The examination of the posterior end of the turbinal bodies is best effected by posterior rhinoscopy, or by the naso-pharyngoscope. (See p. 235.) If the turbinal is enlarged, investigate its consistency by means of a nasal probe (see Fig. 96), most

gently used, in order to decide whether the enlargement is due to osseous hypertrophy or to hyperplasia of the soft parts.

The inferior turbinal body fulfils the function of warming, moistening, and filtering the inspired air. The anterior half is plentifully furnished with mucous glands, and these, keeping the surface constantly wet, moisten the air; while the posterior half, which is richly provided with cavernous blood-spaces, capable of rapid filling and emptying in response to changes of temperature in the air passing over them, may be regarded as a radiator supplying heat to the air. Any condition hindering or preventing the proper fulfilment of these important functions is to be regarded as disease.

Note, therefore, any *obstruction* in the inferior meatus, its size, appearance and connections—whether turbinal, septal, polypoid, or due to a foreign body.

Note, also, the presence of pus or muco-pus in the general cavity of the nose, as it is found in acute catarrhal rhinitis. Simple chronic rhinitis does not cause a purulent discharge; if, therefore, there is a chronic mucopurulent nasal discharge, it is either due to accessory sinus suppuration or to some chronic disease, such as tuberculosis or syphilis.



FIG. 96.—Author's Ring Probe.

“In a case of unilateral purulent discharge from the nose in a child, think of a foreign body; in an adult, think of suppuration in a sinus” (Dundas-Grant).

Having investigated the inferior turbinal body and the inferior meatus, next turn your attention to the *middle turbinal*. (Fig. 95.) This structure, composed of bone covered with a much thinner layer of mucous membrane than the inferior turbinal, is the most prominent object in the nasal cavity after the inferior turbinal. Attached to the lateral wall of the nose, it occupies the greater part of the upper nasal cavity and extends back to the posterior nares. It is normally harder and paler than the inferior turbinal, and is less influenced by vaso-motor conditions. Covered by the blunt anterior end of the middle turbinal is the *hiatus semilunaris*, a cloaca or common gutter running obliquely downwards and backwards in the lateral wall of the nose, into which open, in order from above downwards and from before backwards, the *fronto-nasal duct* leading to the frontal sinus and the anterior ethmoidal cells, and the *ostium maxillare* leading to the maxillary antrum. The process of bone which forms the anterior border of the hiatus semilunaris is known as the *processus unciformis*; that forming the posterior lip, and covering one of the anterior ethmoidal cells, is known as the *bulba ethmoidalis*. The middle turbinal body is closely allied to the ethmoidal labyrinth in health and in disease, and suppuration in the osseous substance of the one is generally associated with suppuration in the other.

The presence, therefore, of pus under the middle turbinal is always

indicative of sinus suppuration, either of the frontal sinus, of the anterior ethmoidal cells, or of the maxillary antrum. (See p. 336.)

The nasal chamber is divided into two parts by the middle turbinal bone—the lower, or respiratory, and the upper, or olfactory. Ideally, the middle turbinal should not touch the septum anywhere, but as a matter of fact contact here and there along the free edge is the rule. Anosmia—loss or deficiency of the olfactory sense—is frequently due to abnormal enlargement of the middle turbinal.

Note, then, the size, colour and consistency of this turbinal. Examine most carefully for purulent discharge. If pus is seen, note particularly whether it is oozing from underneath or coming over the middle turbinal from above. Note the presence of soft carious areas, bare bone, bleeding points, and polypi, which, when present, are usually rooted in this region. Do not mistake an enlarged middle turbinal for a glistening, smooth, bluish-white, movable polypus.

(There is a superior turbinal body, and sometimes yet another, higher, but in health these are not visible on anterior rhinoscopy.)

Into the spheno-ethmoidal recess posteriorly, a few millimetres from the roof, open the orifice of the posterior ethmoidal cells, directed somewhat backwards, and that of the sphenoidal sinus, opening forwards. The latter can only be inspected after removal of the middle turbinal. Pus from these sinuses may appear on anterior rhinoscopy as coming from above the middle turbinal, or, more usually, may be seen, on posterior rhinoscopy, or with the nasal endoscope, emerging from the upper regions of the posterior nares.

The *septum* next demands attention. Notice whether it occupies a mesial position, or whether it is convex or concave towards the side you are examining. Projections or outgrowths (“spurs”) from the septum should be examined, in order to determine whether or not they act as obstacles to the passage of air through the nose. Remember that the septum consists of three main portions—osseous above and behind, where it is formed by the central plate of the ethmoid and the ala of the vomer, and cartilaginous in front, where the triangular cartilage of the nose fills in the gap between the anterior edges of the ethmoidal plate and the vomerine ala. (Fig. 107.) If the septum is deflected, note whether the deflection causes obstruction, and if so which nostril is more obstructed. Sometimes the septal mucous membrane presents a superficial excoriation or ulcer over the front of the cartilaginous portion. Note the presence of perforations of the septum, and if a perforation is present, observe its situation—whether through the cartilaginous, or, behind, through the bony septum—its size, and the condition of its edges, whether they are ulcerating or sound. Note also if there is necrosis of the bony septum. The presence of swelling in the septum—from hæmatoma following an injury, or from abscess—must be also marked.

The anterior-inferior segment of the septum, the usual site of the simple excoriation, alluded to above, is most thoroughly inspected by inserting the speculum, and then turning the patient's head around so that the profile is presented.

Next transfer the speculum to the other nostril, and examine also this side systematically. Compare the appearance of the septum on one side with that of the other, so as to be able to determine the various degrees and varieties of deviation.

In both nostrils observe the general conditions of the nasal mucous membrane—whether it appears hypertrophied or atrophied, moist or dry, red or pale, and note the presence, distribution and character of crusts.

Examine also the state of the floor of the nose. If the nasal cavity contains pus, observe very carefully from which region it seems to proceed.

Nasal Endoscopy.—By means of the straight, fine nasal endoscope (Fig. 97), recommended by the author, it is possible to examine minutely nasal regions which lie out of the range of vision on anterior or posterior rhinoscopy.

Method.—The interior of the nose is lightly anæsthetized with cocaine-adrenalin spray, and after warming, oiling and polishing the endoscope, it is passed along the floor of the nose with its window directed upwards. The inferior surface of the middle turbinal comes into view, with the space between it and the outer wall of the nose, where pus from the anterior sinus group (see p. 336) emerges, and where budding polypi make an early appearance.

Passing backward, the sphenothmoidal cleft comes into the field, and here pus may be seen in cases of posterior ethmoidal or sphenoidal sinus suppuration.



FIG. 97.—Straight Endoscope for nose and naso-pharynx used by the author.

The roof of the posterior choana now appears, and from it may be traced downwards the posterior edge of the septum. At this place, by turning the window towards the opposite side, the posterior end of the inferior turbinal of that side, if it is enlarged, is visible as a grey, semi-translucent granular object, which the student is liable to mistake for a polypus. (See Plate III, Fig. 4.)

Enlargement of the inferior turbinal of the side in which the endoscope is situated is seldom distinguishable, as the swollen mucosa, coming into contact with the window of the instrument, altogether obscures the field.

The endoscope is particularly of value when sphenoidal sinus disease is suspected; when there is a question of small polypi hidden, it may be, behind a large middle turbinal; or when the presence of a sarcomatous or other growth in the ethmoidal region is suspected.

It is also useful after the maxillary antrum operation has been performed, as it enables us to inspect the interior of that cavity.

But we must add that considerable experience with the endoscope is necessary before one can interpret correctly the pictures it presents.

The appearances visible in the naso-pharynx on endoscopy are discussed at p. 238.

Palpation of the Interior of the Nose with the finger is seldom employed in the ordinary examination, as it is a painful proceeding. But in operating

with the patient under general anæsthetic, it is of great value. The little finger (gloved) is inserted into the anterior naris, the palmar aspect being turned outwards, so that the right little finger is used for the right naris and *vice versa*. It is thus possible in many cases to palpate the middle meatus, and in antrum operations to hook it into that cavity. In some cases I have even been able to pass it as far as the orifice of the sphenoidal sinus.

The examination of the nose having now been completed, compare the results obtained with the observations made on the state of the mouth, pharynx, larynx and naso-pharynx, in order that a complete mental picture

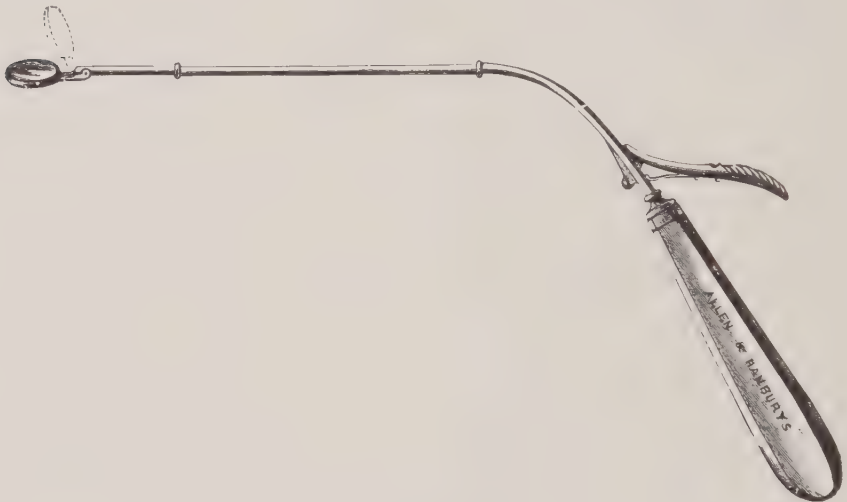


FIG. 98.—Fränkel's Post-rhinoscopic Mirror.

of any departure from the normal may be found, for all these regions are intimately connected with one another.

EXAMINATION OF THE NASO-PHARYNX AND POSTERIOR NARES

Posterior Rhinoscopy.—Although in a systematic description of the methods employed in the examination of the upper respiratory tract an account of posterior rhinoscopy is given after the others have been discussed, it is a good rule in practice to use the post-rhinoscopic mirror early in the examination of the case, before the patient has become wearied or flustered by the examination. Otherwise gagging and retching will effectually prevent any satisfactory attempt to see the naso-pharynx and posterior regions of the nose.

To make posterior rhinoscopy successful much practice is necessary, but time and trouble expended in learning to manipulate the mirror will

amply repay their expenditure in the valuable information obtainable by this method of examination.

Either a small laryngeal mirror or the special post-rhinoscopic mirrors, such as Fränkel's or Michel's, may be employed. (Fig. 98.)

The patient should sit upright, with the head erect, or held slightly backward. Direct the patient to open the mouth without protruding the tongue. Pass a tongue-depressor into the mouth to control the tongue, and ask the patient to breathe gently. Having warmed the mirror, insert it, with the reflecting surface upwards, carefully into the mouth and back into the pharynx behind the uvula, being careful not to let it come into contact with any part—tongue, uvula, or post-pharyngeal wall. Then, when it is in position and under good illumination, slowly tilt the mirror up until it is at about an angle of 45° . This will generally bring the upper part of the posterior end of



FIG. 99.—The Naso-pharyngeal Outline.

the septum nasi into view. Taking this as a landmark, the other structures can be readily found.

In order to view the parts, it is necessary that the soft palate be relaxed. In many cases this is not possible, and attempt at making a post-rhinoscopic examination in such patients is mere waste of time. Various instruments have been devised as palate-retractors, but, since their application as often as not leads to gagging and retching, they have not come into general use.

In an ordinary way, the following points, when attended to, will facilitate the relaxation of the palate: First, make the patient breathe gently. Secondly, do not insist on the mouth being wide open. A half-open mouth will permit us to see all we want. Thirdly, do not put the tongue-depressor too far back. Fourthly, if the mouth being open leads to mouth-breathing with a raised soft palate, ask the patient to make a "sniff" through the nose.

After the mirror has reached the pharynx behind the soft palate, it is, of course, necessary to hold it to one side of the uvula, in order to inspect the image. Withdrawal of the instrument every few seconds, in order to rest the patient and to warm the mirror, is advisable.

The septum nasi, then, having been found, tilt the mirror first to one side and then to the other, at the same time bringing its surface towards an angle of 90° . By this means, the posterior choana of either side will come into view, and, laterally, the posterior ends of the middle and inferior turbinals. (Fig. 99.)

The superior turbinal is occasionally seen. It is to be remembered that posteriorly the inferior turbinal does not present the bright-red appearance one marks when looking into the anterior nares, but that it is greyish-white in colour and granular on the surface. The posterior end of the inferior turbinal is frequently enlarged and sometimes pendulous, hanging down on the soft palate.

Note the presence of pus emerging from the superior or middle meatus of the nose posteriorly. Note polypi, when present, as smooth, glistening, greyish-blue bodies. Do not mistake the posterior end of the inferior turbinal, which is granular, for a polyp, which is smooth.

After the posterior nares have been inspected, tilt the mirror still more, first to one side, then to the other, in order to bring into view the orifices of the Eustachian tubes with the fossæ of Rosenmüller behind them. Sometimes in cases of middle-ear suppuration the pus makes its way down the Eustachian tube, and may be seen on the orifice on posterior rhinoscopy.

Finally, let the mirror fall backwards towards the horizontal and examine the posterior pharyngeal wall as it declines. Adenoids appear as dark-red masses encroaching on the upper end of the septum. Frequently the sulci between these growths are visible, or the central recessus medius can be seen. The adenoids vary much in size; sometimes they are so large as wholly to obscure any view of the nasal septum; at other times they are only represented by a series of small furrows high up in the roof of the naso-pharynx, and between those extremes all sorts of varieties are found.

Polypoid growths or tumours springing from the vault of the pharynx may also be revealed by the posterior mirror.

Endoscopy of the Naso-Pharynx. The endoscope having been inserted and passed through the nose to the naso-pharynx (see p. 235), the window is turned towards the opposite side in order to inspect the orifice of the Eustachian tube. (See Plate III.) In health, the orifice of the tube, with its shelving, smooth anterior lip and its prominent curved posterior lip are clearly visible. Undue redness and swelling are to be noted. Behind the protruding Eustachian cartilage of the posterior lip is the fossa of Rosenmüller, often deep and cleft-like, in which not infrequently a curled ringlet of adenoid tissue is visible (Fig. 167), even, it may be, when no adenoids can be discovered anywhere else in the naso-pharynx. Here, also, at times, cicatricial bands may be seen stretching across the fossa. These appearances may be associated with a granular or œdematous Eustachian lip, with enlargement of the posterior end of the inferior turbinal of the nose, and with deafness from catarrh of the Eustachian tube or middle ear.

Turning the eye of the endoscope round, we view now the Eustachian orifice of the same side, comparing its appearance with that of the other.

Next, the instrument is rotated so as to bring the posterior end of the septum into view about its middle, and by slowly turning the instrument, we follow the septum up to the place where it merges into the roof of the naso-pharynx.

In normal states the septum passes imperceptibly into the smooth mucous surface of the roof, but adenoids, when they are present and bulky, shut off this view, and appear as a vague, dark-red mass without definite form or limit. When adenoids are present, but scanty, they appear as small furrows, and the clefts between them are very obvious.

Rarely, the endoscope may reveal tumour formation in the naso-pharynx, but as a matter of fact, by the time the patient experiences the symptoms caused by new growth in the naso-pharynx, it has already become so large as to be invisible through the endoscope. The reason is, that when the instrument comes very close to any object, the small window is occluded by the mass around it, and the whole field is obscured.

It is possible from the naso-pharynx to view the postero-superior surface of the velum palate, and also sometimes even to see as small, distant objects the interior of the larynx and the vocal cords.

Direct Inspection of the Naso-Pharynx, or of its lateral and posterior walls at least, can be made through *Yankauer's speculum*, and this instrument provides an easy and convenient method of making local applications to these regions and also to the orifice of the Eustachian tubes.

Palpation of the Naso-Pharynx is only employed when posterior rhinoscopy and endoscopy fail to afford a satisfactory view of the naso-pharynx, or when it is necessary, in order to supplement the information derived from inspection of the parts.

It is unnecessary, we may add, to palpate the naso-pharynx for adenoids in a child with enlarged tonsils, at all events, before the anæsthetic is given at operation.

Method.—The surgeon's right forefinger is guarded by a rubber finger-stall, and with a metal guard or a fold or two of bandage to protect the knuckle. The patient is seated, and his hands are held by a nurse or an assistant sitting in front of him. The surgeon stands on the patient's right, puts his left arm round the patient's neck, and brings the forefinger of his left hand into contact with the patient's left cheek. Then, on asking the patient to open his mouth, this finger pushes in the cheek between the upper and lower molar teeth—manœuvre which keeps the mouth open during the subsequent manipulations. The guarded finger is then passed into the mouth, to the lateral wall of the pharynx, and slipped up behind the faucial pillar, and not in the middle line, as in this situation the soft palate and uvula are pushed on in front of the examining finger and block the entrance to the naso-pharynx. Having gained the naso-pharynx, the finger-point rapidly and gently feels for the septum, and then is passed into each posterior choana to ascertain the state of the turbinal bodies, and the presence of polypi, mucous or fibrous. Then the finger, turned slightly round, is moved slowly from side to side, so as to palpate the lateral and posterior walls of the pharynx. Here adenoid vegetations are felt as soft, friable bodies with vertical sulci. The presence of smooth, rounded tumours should be noted, and their attachments made out.

Take note also of the height of the pharyngeal vault, and the general roominess of the space. After withdrawal, the finger-point should be inspected for traces of blood, pus, etc.

Palpation of the naso-pharynx should never cause pain, and need not occupy more than a few seconds.

ANÆSTHETIZATION AND GENERAL THERAPY OF THE NOSE AND NASAL SINUSES

For purposes of examination a slight spraying of the interior of the nose with 5 per cent. sol. cocaine with a little adrenalin is useful, as it causes shrivelling up of the turbinals, and permits a free inspection.

Local Operative Anæsthesia—Cocaine Tamponage.—For minor operations like the removal of polypi (see p. 285) and polypoid or papilliform enlargements of the inferior turbinal, a thin, flat piece of cotton-wool is soaked in equal quantities of sol. cocaine, 10 per cent., and sol. adrenalin, 1-1000, and



FIG. 100.—Dissection of Nose, showing situation of Meckel's ganglion and its branches. (From E. Musgrave Woodman.)

laid upon the surface to be operated upon, being spread out flat like paper on a wall. Anæsthesia, which, however, is usually but partial, is obtained in about five minutes, and lasts twenty minutes.

Cocaine-Adrenalin-Paste (O. Freer) affords by far the most complete and durable anæsthesia. The writer has been employing it for many years, and can recommend it as supplying the maximum local with the minimum constitutional effect.

It is suitable for septum operations of all kinds; for proof-puncture of the antrum; and as a local anæsthetic in sinus operations, whether a general anæsthetic is given also or not.

Used as follows, and with the patient lying down, constitutional effects are absent, notwithstanding the large quantity of pure cocaine that is used.

It is contra-indicated in polypus removal, as in that case there is usually

very free mucous secretion and the cocaine paste may be displaced and swallowed.

Method.—The patient is given a preliminary hypodermic of morph. hydrochlor. gr. $\frac{1}{4}$ to $\frac{1}{3}$, with or without atropin. sulph. gr. $\frac{1}{100}$. A swab of cotton-wool is twisted round a suitably long probe, and that is dipped, first of all, in pure adrenalin solution (1-1000), and applied under inspection to the mucous surface of the region of operation. From 4 to 6 grains of cocaine are then placed in a porcelain receptacle, and one or two drops of the pure adrenalin solution are added to the cocaine until a paste or "mud" is formed. With this mixture the region is painted carefully over by means of the swab, and in three minutes anæsthesia and local anæmia are produced. The anæsthesia lasts about forty minutes.

By applying this mixture to the mucosa over Meckel's ganglion behind



FIG. 101.—Patient Prepared for Nasal Operation.

and above the posterior end of the middle turbinal (Fig. 100) the posterior lateral region of the nose may also be anæsthetized.

Operations on the Nose.—It is assumed that the reader is acquainted with the aseptic technique of modern surgery. In operations on the interior of the nose, asepsis is aimed at by surrounding the nasal orifice with aseptic towels, with sterilized gauze over the mouth and bridge of the nose, and with a sterilized towel round the head. The eyes may be left uncovered. (See Fig. 101.)

Before applying the sterilized wrappings, the outside of the nose, the upper lip, chin, and particularly the skin-lined vestibule may be painted with iodine-spirit solution.

Strict asepsis should rule in the operation. The operator should wear gloves.

It is easy to infect a healthy nose with pyogenic organisms, and to substitute an ethmoidal suppuration for a deflected septum.

Nasal Douching and Lavage may be employed when necessary, for the

removal of blood-clot or purulent discharges. The syringe recommended is Mayer and Phelps's nasal syringe (Fig. 102). It should be boiled before use. (See p. 275.)

Packing the Nose for hæmorrhage is to be avoided whenever possible. It is painful to insert, painful to remove, and apt to infect the nose. Further, it may be followed by serious symptoms if employed when there is sinus suppuration. Nevertheless, it also is sometimes unavoidable.



FIG. 102.—Nasal Syringe for Nasal Lavage.

Long strips of sterilized gauze are employed. The long-bladed nasal speculum is inserted, opened, and the gauze packed in by means of nasal forceps. If the bleeding point is known local packing is usually sufficient to control it. Only in the operation of submucous resection of the nasal septum is packing of the whole cavity on both sides necessary.

Packing should be not retained for any longer than twenty-four hours. It should then be removed, a fresh pack being re-inserted, if necessary. The gauze is easier to insert and to remove if it is wrung out of sterilized liquid paraffin before use.

CHAPTER VIII

AFFECTIONS OF THE NOSE

EXTERNAL DEFECTS AND DEFORMITIES

I. **Congenital.**—Allusion is made in the section dealing with cleft-palate to the attachment of the premaxillary bone to the tip of the nose (p. 647).

In addition to that the nose sometimes shows undue broadening, with the semblance of a cleft in the middle line, from imperfect union of the two mesial nasal processes, and dermoid cysts and fistulæ have been described as occurring in the middle line of the nose. Do not mistake a meningocele at the root of the nose for a dermoid cyst.

The *Dermoid Fistula* appears as a minute opening in the middle of the dorsum of the nose, exuding a periodical discharge. Its removal is difficult, as the whole of its epithelial lining must be dissected away if recurrence is to be prevented. Moreover, it extends deeply, and may be attached to the dura mater in the mid-frontal region (W. Stuart-Low), or to the longitudinal sinus (Betham Robinson).

II. **Developmental.**—A not infrequent developmental deformity, and one which gives rise to nasal obstruction, is an unduly **broad columella**, whereby the anterior naris of either side may be reduced to a mere slit, the airway of which is often in these conditions further encroached upon by a prominent inner process of the lateral cartilage.

The lateral cartilage of the nose, it may be remembered, arches over the anterior naris, and by its inner process (*crus mediale*) helps to form the medial (internal) wall of the skin-lined vestibule. If the curve of this process is too pronounced, its free end will project the skin into the vestibule, and reduce the capacity of the air channel.

The condition is obvious on simple inspection, but if examination is limited to inspection through a speculum, it may escape notice.

The *Treatment* is operative. Under infiltration anæsthesia of the columella and vestibule with eucaine (4 per cent.) or under general anæsthesia, the patient's head being tilted well back, the skin of the unduly broad columella is closely applied to and folded tightly round the anterior

end of the septal cartilage of the nose by the surgeon's finger and thumb. This will indicate how much of the redundant skin it is necessary to remove. Having been relaxed the columella is now transfixed from side to side at its upper end with a fine knife, its cutting edge downwards. With a careful sawing movement, the knife is carried down to the level of the floor of the vestibule, and withdrawn. (See Fig. 103.) The posterior lip of the incision so made is dissected back, first on one side, then on the other, until what is seen to be sufficient skin is undercut and freed. This generally resolves itself into a crescentic flap. As much of this flap as is required is cut away and removed, the raw surface left being covered by suturing the edge of the first incision at the margin of the columella, with the edge of the second incision at the margin of the mucous covering of the septum on either side. (See Fig. 104.) If the process of the lateral cartilage is

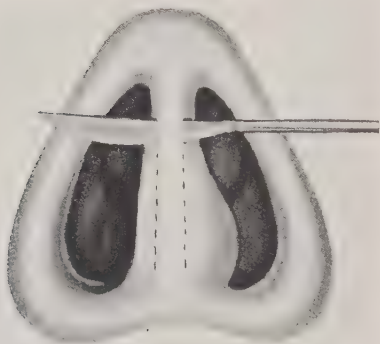


FIG. 103.—Incision for Repair of Deformity of the Columella.

(The deformity is usually bilateral. It is figured here unilateral for diagrammatic reasons.)



FIG. 104.—Operation for Deformity of the Columella.

projecting, it is easily exposed in the course of the dissection, and as much of it as is necessary removed by the knife or cutting forceps (Stuart-Low).

High Bridge.—An unduly high or prominent nasal bridge is unsightly, and the rhinologist may be consulted with a view to its improvement. It may be remedied by—

Operation.—(a) An incision is made in the middle line of the nose, the skin and soft parts are dissected off the bone, and as much of the latter is sawn or gouged off as may be necessary to remove the deformity.

This method leaves an external scar, for which reason the following operation *through* an incision in the *vestibule* is generally preferred.

The first steps of this method constitute the *normal* for all operations undertaken with the object of *remedying bridge deformities*. Consequently they will now be described once and for all.

(b) A general anæsthetic is necessary. The nasal vestibule is clipped of its vibrissæ and carefully painted with iodine. With a sharp knife an incision is made (see Fig. 105) through the roof and outer wall of the skin-lined vestibule of one side, the incision being deepened under the guidance of the finger externally until the point of the knife reaches the outer subcutaneous surface of the nasal bone of the same side. A curved periosteal elevator is now introduced, and the soft parts over the entire bridge of the nose elevated subcutaneously from the nasal bones, and, if necessary, from the ascending process of the superior maxilla. (See Fig. 106.)

This gives free access to the bridge, and the subsequent steps depend upon the type of deformity.

When the bridge is unduly high, a fine saw, or gouge, or Ballenger's reverse chisel is employed to reduce it to the desired height.

After the deformity has been reduced or repaired, the patient's head is turned on one side, and the wound freely flushed with normal saline solution to wash out *débris* and blood-clot.

Finally, the bridge of the nose is covered with a collodion dressing,

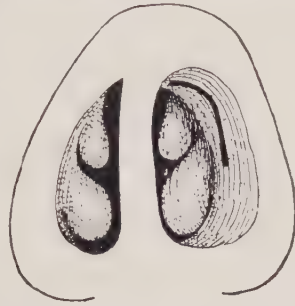


FIG. 105.—Normal Incision in the Roof and Outer Wall of the Skin-lined Vestibule for access to the bridge of the nose in the subcutaneous operations for bridge deformities.

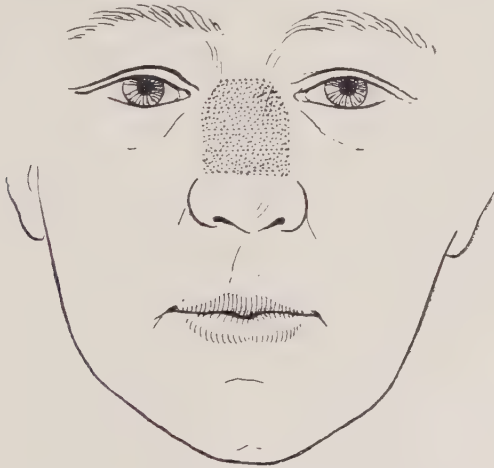


FIG. 106.—The shaded area indicates the extent of the bridge of the nose bared subcutaneously through the vestibular incision (Fig. 105) in operations to remedy bridge deformities.

while a firm roll of lint is placed against either side of the nose and secured with strips of plaster, so as to keep up pressure and lessen the tendency to hæmatoma and sepsis.

A dry packing in the vestibule is sufficient to seal the vestibular incision.

Difficulties and Dangers.—The separation of the soft parts is easy, but considerable experience is necessary to estimate how much or how little of the bridge is to be removed (or, it may be, to be supplied).

The chief danger is hæmatoma after operation, and subsequent septic infection of the extravasated blood, and as the face is exceedingly vascular, this accident is very prone to occur and may spoil the best-planned operation, especially when a cartilage or bone-graft has been inserted, as in the treatment of the deformities about to be detailed.

It is best prevented by careful dressing, firmly applied as described above.

Results.—In normal conditions the results are very satisfactory.

III. Acquired Deformities and War Injuries.

The “Pinched” or Narrow Nose is a common consequence of neglected adenoids in childhood and the consequent mouth-breathing, forming one of the features of what has been termed by the writer “the rodent face.” Owing to the constantly open mouth, and the consequent withdrawal from the upper jaw of the expansile moulding action of the tongue, coupled with the incessant drag and pressure of the muscles and soft parts of the cheek on the developing alveolar processes, a lofty or “Gothic” palatal arch is produced (Fig. 166), in consequence of which the permanent teeth of the upper jaw, and especially the incisors, erupt irregularly and are cramped and crowded together, projecting below and beyond the upper lip, and failing to meet the lower incisors in biting (“the open bite”). The whole superior maxilla being narrowed, the nose is pinched, the nasal cavities are laterally compressed, and their breathing capacity is very seriously reduced. The limited nasal capacity is, moreover, still further diminished by deviation of the septum, which is almost invariable in these cases, while, to complete the picture, it is quite common to find, even in adults, the peccant adenoids still occupying the naso-pharynx.

Symptoms.—The result of this chain of malformations is, in addition to the unsightliness of “the rodent face,” the persistence into adult life of mouth-breathing, with all its attendant discomforts and dangers.

Treatment.—Apart from prevention by early removal of adenoids, treatment of the deformity should be initiated as soon as it is observed.

The aid of the dentist should be sought to rectify the irregularity of erupting or erupted teeth. In established cases, the deformity is irremediable as such, but efforts should even then be made by the dentist to secure the ability to close the mouth easily, and by the rhinologist to render the nasal cavities as roomy as possible.

Adenoids (and tonsils, if present) are removed; the columella, if thickened, is reduced as described at pp. 244, 245; and the septum is straightened by submucous resection. In extreme cases, where such measures have failed to confer the ability to breathe through the nose, I have, once or twice, made a large perforation in the septum from near the anterior to the posterior naris, in order to give more nasal capacity.

But the benefit was trifling, though the result proved the experiment to have been harmless. Rhinitis sicca did not ensue.

Depressions of the Bridge of the Nose.—The group of deformities comprised under this heading are such as are caused by trauma, as (1) of a blow fracturing and flattening the nasal bones and fracturing or bending the septum; (2) of a hæmatoma abscess of the septum whereby a large septal fenestra is produced owing to necrosis of the septal cartilage (see p. 265); or (3) by the destructive action of tertiary syphilis on the skeleton of the nose (see p. 299) (saddle-bag nose, etc.).

These different conditions are grouped together here because the deformities they produce are of the same type in that the bridge of the nose is depressed or flattened and the treatment consists in building it up again.

Treatment.—*Paraffin Injections.*—The injection of solid paraffin by means of a special syringe into the loose tissues of the bridge is alone worthy of consideration, as the injection of liquefied paraffin brings with it the danger of embolism. And even the solid paraffin is nowadays seldom employed, as experience has shown that in course of time it evinces a disposition to spread about the face, reproducing the old and introducing some new deformities, besides acting as a tissue-irritant. (Wyatt Wingrave.)

Cartilage or Bone-Grafting has taken the place of the paraffin injection. Cartilage is perhaps preferable to bone, as the latter is said to undergo slow absorption in the tissues. The cartilage may be conveniently supplied from the nasal septum, if, as is frequently the case, the septum is being operated on by submucous resection at the same time. Otherwise, a suitable strip may be obtained, in young people, from a costal cartilage. The strip of cartilage should be oblong, and flat or rounded, being pared as near to the size desired as possible. Edges and corners should be rounded off.

The first step of undermining the skin and subcutaneous tissue of the nasal bridge through the vestibular incision should be completed before the cartilage is cut, so as to obtain the latter fresh. If removed first, it must be carefully preserved in warm, normal saline. The cartilage graft is inserted through the vestibular incision, and manipulated into place by the fingers externally. The compresses and dressings are applied as already described.

The *result* is often surprisingly good, but considerable experience in these operations is necessary.

Lateral Displacement of the External Nose, such as is produced by a blow or a fall on one side of the face and bridge (see p. 265), may be considerably improved by passing a fine saw through the vestibular incision, after the soft tissues have been undermined, and sawing through, on the convex side, the nasal bone and nasal process of the superior maxilla—avoiding injury to orbit and lachrymal apparatus—and subsequently pressing the nose over to that side.

Defects of the External Nose from War Injuries.—Loss of substance from the nose may extend up to complete loss of the feature. Treatment is reserved for cases where the deformity is grievous, as where there is a defect in the nose leading direct to the interior, and where portions of the nose, or the whole organ, are lost. The detailed treatment lying beyond the scope of this book, we shall limit ourselves to general principles.

Defects of the bridge opening directly into the nasal chamber may be closed, as Andrew Wylie was the first to point out, by loosening the middle turbinal partly from its attachment, and “advancing” it to fill the gap. Thereafter, a flap of skin may be cut from the cheek or forehead, turned round and sutured to the margins of the opening.

Loss of the entire organ with the laying open of the nasal chamber has been remedied by the brilliant work of Major Gillies and his colleagues. By “advancing” the turbinals, and by cutting strips and flaps of septal cartilage, together with flaps cut from the forehead, or cut from and held in place by the forearm of the patient, they have been able to restore the nasal prominence and organ to such a degree as to rid these patients of the haunting sense of a repulsive deformity.

Readers interested in this side of the work are referred to the ‘Proc. Roy. Soc. Med.,’ Laryng. Sect., 1917.

Web of the Vestibule.—Sometimes the vestibule of one or both nostrils is partially occluded by a web-like band of integument springing from the floor of the nostril. It may be removed with the knife, the raw surface left being sutured or covered with a skin-graft.

DEFORMITIES AND DEFECTS OF THE INTERIOR OF THE NOSE

Cellular Distension of the Middle Turbinal.—The middle turbinal is a process of the ethmoid, and in the development of ethmoidal cells about puberty, a cell may form in the middle turbinal and distend that structure so much as to cause a bending of the septum to the opposite side, and even a bulging of the nasal process of the superior maxilla externally. It seems to be commonest in females, and it occasionally sets up severe and continuous pain at the side or over the bridge of the nose.

On *inspection*, the cause of the pain is obvious in the smooth, hard enlargement of the anterior end of the middle turbinal.

Diagnosis.—It is distinguished from nasal polypus by being red, hard and immovable. From mucocoele of the ethmoidal region and from enlargement of the bulla ethmoidalis it may not be distinguishable until after operation.

Treatment.—Anæsthetize by cocaine-adrenalin paste (see p. 240); or general anæsthesia by nitrous oxide may be employed.

Luc’s or the writer’s nasal forceps (Fig. 127) are introduced into the nose and made to take a full grasp of the bulbous anterior end of the

middle turbinal. The forceps are closed, quickly twisted round and withdrawn. Two bites may be necessary if the cell is a large one.

Or, the method employed in snaring a large middle turbinal may be tried, although the bulk of the bone to be removed renders the snare unsuitable for this variety of enlargement. (See p. 351.)

In a manner analogous to the production of the foregoing deformity, the *bullæ ethmoidalis* may undergo excessive development, and may even extend down into the inferior meatus. By the enlargement of the bullæ, the middle turbinal is compressed against the septum and out of sight, and it is only after removal of the distended cellular bone that a proper diagnosis can be made, for the hypertrophied bullæ is almost invariably mistaken for the middle turbinal.

It may be removed under cocaine by the writer's forceps.

Choanal Atresia or Occlusion of the Posterior Choana is sometimes met with. The occluding diaphragm, which blocks the whole of the posterior naris, is as a rule partly bony and partly membranous, but sometimes it is entirely composed of bone. As a rule also it is unilateral, but bilateral atresia is not unknown (W. S. Syme, 'Journ. of Laryng.,' vol. xxxvii, p. 196). It is a congenital condition.

Symptoms.—The patient is totally unable to breathe through the affected nostril, or to blow it, and in consequence it is constantly filled with a glairy mucus like starch, which flows out of the nose when the head is held forward.

The diagnosis is easily made on posterior rhinoscopy, the closed choana being seen in the mirror. It often shows a central dimple or depression. It may be distinguished from cicatricial closure by the membranous feel of the occluding diaphragm on palpation of the naso-pharynx.

Treatment.—Under general or local anæsthesia the diaphragm is incised as fully as possible with a sharp, stout scalpel, and then by means of a long burr, its bony edges are rubbed down level with the walls of the nose. There is a tendency for the membrane to form again, but this can be avoided by removing a piece of the posterior end of the nasal septum with a pair of Löwenberg forceps introduced through the mouth and naso-pharynx.

Bourgeois, of Paris, speaks highly of diathermy for removing the diaphragm and preventing its recurrence.

DEVIATIONS AND SPURS OF THE NASAL SEPTUM

In the adult nose a certain degree of septal deviation is normal. Abnormality is reached when the deviation is so considerable as to cause nasal obstruction or to excite reflex neuroses. The same rule holds good regarding spurs and outgrowths from the septum.

Ætiology.—Deviations of the septum are developmental or traumatic.

Developmental Deviation is seldom seen before the age of seven years. It is predisposed to by the presence of adenoids, and occurs in the typical "rodent face" deformity. But it is also common in people who have never

suffered from any other effects of adenoids, and, as it is more frequently met with in civilized than in savage races, we may suppose that its frequent occurrence in the former is due, in some way, to their larger cranial development.

The varieties of deviated septum and septal spur are many. It suffices, as a rule, to note to which side the septum is deviated, together with the degree of occlusion of nostril present. Deflections are usually most marked in the triangular cartilage, which on section appears as a simple arc, with the concavity towards one nostril and the convexity towards the other. It occasionally happens that the anterior end of this arc is formed by the extreme anterior end of the septal cartilage, the so-called "columnar" cartilage, and when this occurs, it involves a displacement of the columnar cartilage from the columella. This deformity, sometimes known as *displacement of the columnar cartilage*, is visible from without on ordinary inspection of the nose, and may produce obstruction in the vestibule. This type requires a special modification of the submucous resection operation for its removal. (See later, p. 260.)

A combination of deviation of the septal cartilage (and it may be also of the vomerine septum) with a *spur* is often met with, in what is known as the *oblique ascending spur*, an outgrowth of cartilage (the cartilage of the vomer) along the lower edge of the septal cartilage, that passes upwards and backwards between the central plate of the ethmoid and the vomer. (See Fig. 107.) This spur begins close to the anterior end of the septum, and near to the floor of the nose, and it is a useful landmark in operating (albeit sometimes difficult to negotiate), as it marks the upper edge of the vomer; that is to say, the line where the cartilage meets the bone of the vomerine septum.

The oblique ascending spur varies greatly in prominence. Sometimes it is no more than a mere boss or moulding on the septum; at other times it projects right across the nasal passage as a sharp spine, which may even be closely in contact with the outer wall of the nose. It is characteristic also of this spur for it to become more prominent as it passes backward, so that we not infrequently find the nasal passage narrowed to the degree of obliteration about the position of the posterior end of the middle turbinal. Such obstruction may altogether escape notice on casual examination.

Another spur of importance, both as a cause of obstruction and as requiring special attention in the septum operation, is what is known as the *basal spur*, which is a unilateral hypertrophy or exaggeration of the mesial palatal ridge of the superior maxilla, most marked towards the front of the septum. When it is present, the septal cartilage is often bent in such a way that the lower border of the cartilage is displaced towards the opposite side of the nose from the basal spur, and thus there is formed a deep recess, fossa or gutter in the septum, in the depths of which the muco-perichondrium is adherent, and is thus liable to be torn through in the operation. The basal spur is bony.

The foregoing varieties of deviation are developmental in their origin

and nature, but in addition to these we encounter bends, sometimes very extreme and irregular, which are the effect of *traumatism*: the so-called *traumatic deviation*.

For convenience we shall deal with it also at this place.

In the commonest type of **traumatic deviation** the bend is vertical—that is to say, it runs up and down; and it is limited to the anterior portion of the septal cartilage. Often this deflection is so extreme as to block the

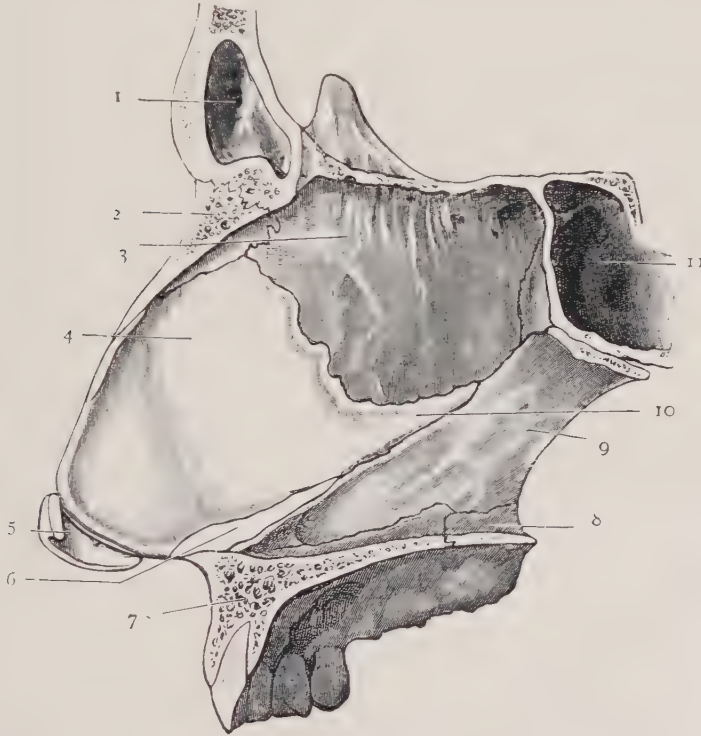


FIG. 107.—The Nasal Septum. (From Cunningham's 'Text-book of Anatomy'.)

(1) Frontal sinus. (2) Nasal bone. (3) Central plate of ethmoid. (4) Quadrilateral cartilage of the septum. (5) Lateral cartilage. (6) Vomerine cartilage. (7) Superior maxilla. (8) Palate bone. (9) Vomer. (10) Cartilage of the vomer (or sphenoidal process). (11) Sphenoidal sinus.

nostril entirely, and the bend is then usually quite angular—obviously the result of a blow on the point or to one side of the nose, "buckling" or fracturing the cartilage. And yet posterior to the deflection the septum may be quite straight. Occasionally, however, we come across cases in which this type of traumatic deviation is combined with the developmental variety, and with an oblique ascending spur.

As might be expected, traumatism is responsible for the irregularly contorted septa that come for treatment, and as these are generally the

after-effects of quite serious injuries, the structure of the septum is frequently very irregular. At bends and angles, areas of adhesion between the cartilage and its perichondrium, the results of fractures or of hæmatomata, are encountered in operating, and add to the difficulties and tedium of our task.

Symptoms.—The effect of deviation is to narrow one or both sides of the nose, and the narrowing may be so considerable as seriously to reduce the capacity of the airway. When the obstruction is unilateral, it might be supposed that the increased width of the opposite side would compensate for the narrowing. And this may be true to begin with as regards the septum, but under these conditions, and probably in response to the stimulus of the increased quantity of air that is passing in and out of the wider nostril, the turbinals of that side undergo hypertrophy, and in course of time come actually to block this, the originally open side, and so it often happens that the side the patient feels obstructed is not the side of the septal convexity, but that of the septal concavity.

Thus a deviated septum in causing *unilateral* obstruction leads to hypertrophic rhinitis in the wider side, and so, it may be in course of time to all the phenomena and sequelæ of chronic *bilateral* nasal obstruction.

Another common effect of deflection of the septum, with or without spur formation, is interference with the drainage, and, perhaps, also with the ventilation of the nasal accessory sinuses. This is evident from the fact that a grossly deflected septum is frequently found in association with acute sinus suppuration on the narrowed side. Obviously, the encroachment upon the free space of the middle meatus of the nose by the displaced septum limits the room available for swelling of the mucosa about the ethmoidal region, and so favours the occurrence of acute sinusitis. To a similar effect, also, we may attribute the occurrence of polypoid disease in cases with septal deviation. For it is noteworthy that the polypi, as a rule, make their first appearance upon the narrow side of the nose.

A third group of symptoms is at times attributable to septal deflection, especially when the septum or a part of it, such as a prominent sharp spur, is in actual contact with a turbinal or with some part of the outer wall of the nose. This group is that of reflex irritation. Thus we find reflected pain and headache (L. H. Pegler); irritable cough; sneezing; paroxysmal rhinorrhœa, and even, at times, such remote reflexes as asthma, cured by septal resection and the separation of points that have been in contact.

We must add a note of caution at this juncture. When these phenomena are present the septum operation is justifiable—indeed, it is necessary. But the surgeon should be careful not to promise too much. Sometimes the operation is successfully accomplished, and yet the pain, cough, asthma, or what not, continue in spite of all.

Treatment.—We operate to straighten a deflected septum when—

- (a) It is causing nasal obstruction on one or both sides.
- (b) It is associated with epistaxis, polypus formation or sinus disease.

- (c) It seems to be the source of reflex irritation.
- (d) It prevents access in operations on the antrum, on the frontal, ethmoidal, or sphenoidal sinuses ; or on the lacrymal sac.
- (e) By its effects, it seems to be producing catarrh of the Eustachian tube and middle ear, or when it prevents the passage of the Eustachian catheter, if the use of that instrument is likely to cure the deafness.
- (f) In chronic laryngitis, and in some cases of papilloma of the larynx and tuberculous laryngitis when there is some nasal obstruction. (See, however, p. 262.)
- (g) In recent traumatism with hæmatoma of the septum.

Operation on the septum also forms the preliminary step to the trans-nasal operation on the pituitary body. (See p. 324.)

Contra-indications—Local.—Operation is contra-indicated if the deviation is producing no symptoms, and in bilateral atrophic rhinitis ; acute rhinitis ; and syphilis of the nose or pharynx.

General.—Diabetes and asthenic conditions generally.

Nasal sinus suppuration is *not* a contra-indication.

SUBMUCOUS RESECTION OF THE NASAL SEPTUM

(See Figs. 108 to 115.)

Description.—The raising of the mucous membrane (muco-perichondrium and muco-periosteum) of both sides of the septum through a single unilateral incision, and the removal of as much of the contained cartilage and bone (Fig. 115) as is necessary to rectify the septal deformity and to restore free bilateral nasal breathing.

Anæsthesia.—(1) *Local.*—(a) By means of cocaine-adrenalin paste as described on p. 240.

In making the application particular attention may, with advantage, be paid to the region of the naso-palatine nerve on either side of the septum.

(b) By the application of tampons of cotton-wool soaked in 10 per cent. sol. cocaine and 1-1000 sol. adrenalin.

The former is recommended as more satisfactory and safer.

(2) *General.*—For patients who desire a general anæsthetic chloroform is given. But in this also the septum must be treated with cocaine-adrenalin prior to operating, in order to secure a dry, bloodless field. A useful plan is to make one application of the cocaine-adrenalin paste immediately before the general anæsthetic is started.

In children cocaine should be avoided. Adrenalin only should be applied, in the 1-1000 strength a few minutes before operating, as its effects are evanescent in children.

Position.—The patient lies on the operating table on his back, with the head slightly raised. The surgeon stands on the right-hand side. Rigid aseptic technique should be adhered to throughout. The illumination must be as bright as can be got.

Operation.—The nasal speculum is inserted into the nostril of the *convex* side of the deviation, and a long gauze strip is gently packed into the posterior region of the nose in order to prevent blood finding its way back into the throat.

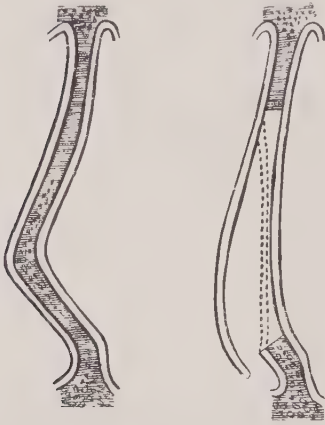


FIG. 108.—Submucous Resection of the Nasal Septum. Removal of cartilage. (Diagrammatic after Laurens.)

With a short-bladed knife a curved incision is made through the mucous membrane and perichondrium of the septum down to the cartilage. The incision is carried from near the roof of the vestibule down to the floor of the nose and lies just behind the skin-mucous membrane junction. (Fig. 109.)

(When there is a prominent, sharp, bony spur present, it is often advisable to reverse the direction of the incision, beginning below on the floor of the nose and carrying it up to near the roof of the vestibule.)

This incision, through which all subsequent manipulation is to be carried out, should be deepened to the surface of the cartilage.

A suitable elevator (Greville Macdonald's recommended) is now passed

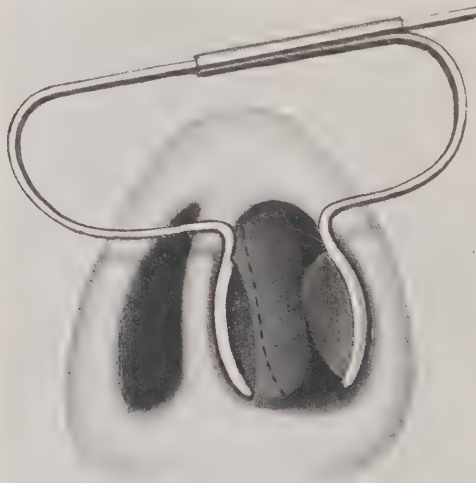


FIG. 109.—Submucous Resection of the Nasal Septum. (1) The line of incision.

under the posterior lip of the incision, and the muco-perichondrium is raised from the cartilage. (Fig. 110.)

Normally, at the site of the incision adhesions to the cartilage render this separation difficult for a moment or two, but by keeping assiduously close to the cartilage a plane is reached where the separation can be effected with ease, the elevator passing backward, upward and downward almost of its own weight.

No force should be used, and if an obstacle is encountered it is left for the time being, note being made of its situation for later treatment. The usual position for such an obstacle is at the junction of the septal cartilage with the palatal ridge of the superior maxilla (the basal spur). To this we shall recur.

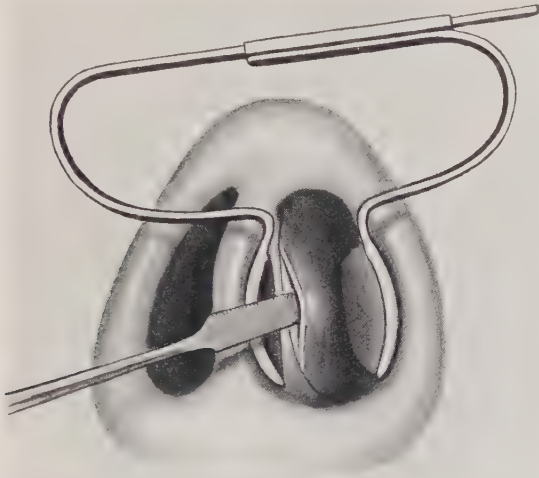


FIG. 110.—Submucous Resection of the Nasal Septum. (2) Introduction of the elevator.

As much muco-perichondrium is raised as will give free access to the deviated part of the septum. (See Fig. 115.) That done, a blunt-pointed knife is taken and the cartilage itself is incised from above downwards in the line of the original mucous membrane incision. This carries us through the cartilage to its opposite side, and in making this cut care must be taken not to wound the mucosa of that side.

By the pressure of a finger in the opposite nostril the cartilage is now pushed over into the original wound, so as to make its cut edge present, and under this cut edge is slipped again the elevator in order to elevate the muco-perichondrium of the opposite side. (Fig. 111.) This elevation is most safely and readily accomplished under inspection, the speculum being changed to the corresponding side of the nose. The area of muco-perichondrium raised corresponds to that of the first side.

A long-bladed speculum (see Fig. 112) is now slipped between the lips

of the incision and passed in between the cartilage and the loosened

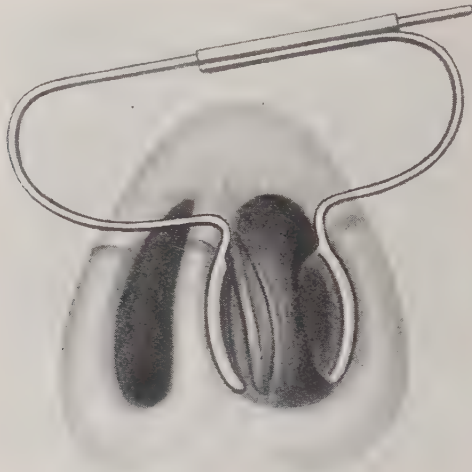


FIG. 111.—Submucous Resection of the Nasal Septum. (3) The mucosa on the convex side has been separated; the cartilage has been cut through and its cut edge pushed over to make it present in the wound.

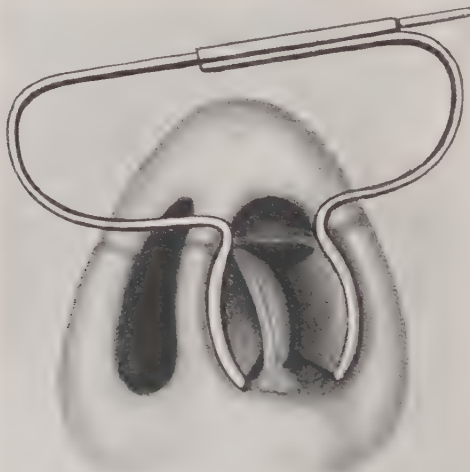


FIG. 112.—Submucous Resection of the Nasal Septum. (4) The long-bladed speculum has been inserted and opened so as to raise the loosened mucosa of both sides from off the septal cartilage, thus isolating the cartilage.

muco-perichondrium, one blade being on one side, and the other on the

other, so that when the blades of the speculum are opened the cartilage is seen isolated between them. (See Fig. 112.)

With cutting forceps or with Ballenger's swivel-knife as much as is desired of the cartilage and bone thus isolated is removed. This usually carries us up to the level of the middle turbinal above, and to the anterior edge of the vomer behind, taking also, if convenient, the oblique ascending strip of cartilage. (Figs. 113 and 115.)

We now return to the *adhesion* along the line of the *basal spur*.

Anatomically, the periosteum of the basal spur, which, as we have seen, is composed of bone, passes over the spur from one side to the other without

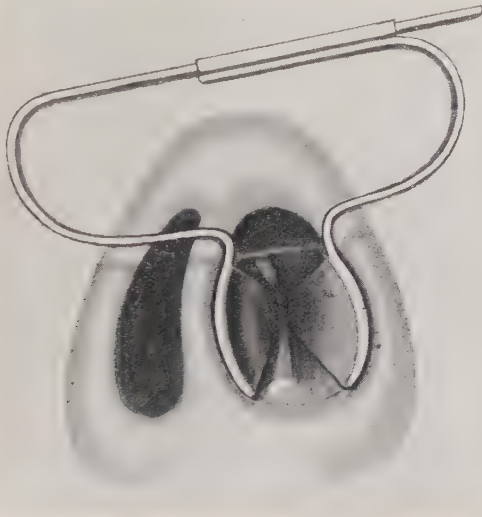


FIG. 113.—Submucous Resection of the Nasal Septum. (5) View after removal of the isolated septal cartilage.

a break, and thus the subperichondrial space of the septal cartilage is not continuous with the subperiosteal space over the bone of the spur, and in elevating the coverings of the septum, before we can pass from the cartilage to the bone of the basal spur, this layer of tough periosteum has to be traversed. The speediest way of doing so is to cut through it with a sharp knife, cutting on to the bone, and in such a direction as not to button-hole the mucous membrane. If this is postponed until part of the cartilage has been removed it may be done under inspection. Sometimes, however, it is more convenient to make the division at an earlier stage, and even, it may be, at the very start of the operation.

Once this periosteum is incised, the elevator, inserted once more, raises it from the basal spur, first from one side, then from the other, and after it is bared, with a bent, square-ended gouge (Fig. 116), the

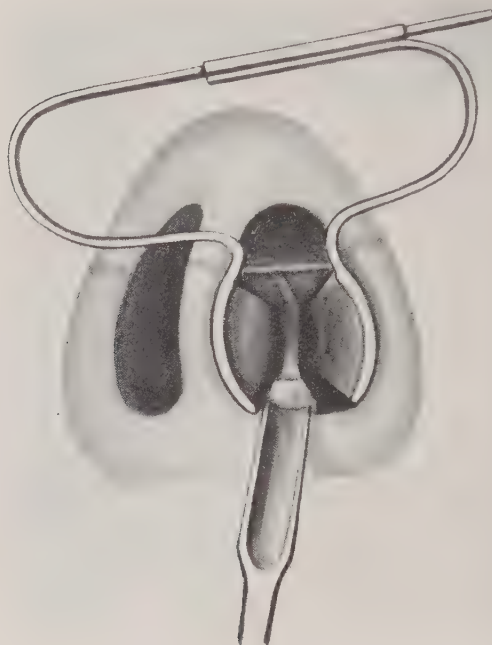


FIG. 114.—Submucous Resection of the Nasal Septum. (6) The gouge applied for the removal of the basal spur of bone.

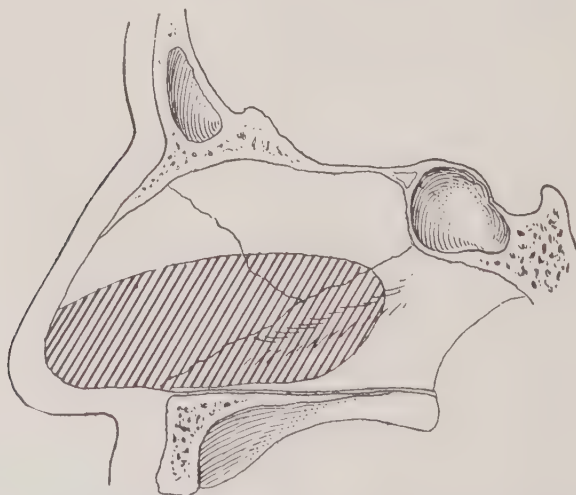


FIG. 115.—Diagram showing the extent of the cartilage and bone usually removed in submucous resection of the nasal septum. (In operating on the pituitary body the removal is carried back as far as the sphenoidal sinus—see p. 324.)

bony spur is undercut from before backwards, levered up and removed. (Fig. 114.)

The long speculum is now withdrawn from the nose, the flaps are allowed to fall together, and by means of the ordinary short speculum, the nasal cavity is inspected, in order to see whether enough has been removed to provide a free airway on either side. As a rule, two further portions of the septum require attention: (1) posteriorly in the vomerine region, especially on the middle turbinal level, where the remains of an oblique ascending spur still need attention; and (2) anteriorly, at the upper end of the original incision, where some of the edge of the cartilage still needs trimming.



FIG. 116.—Killian's Bayonet Gouge (for the basal spur in submucous resection).

The long-bladed speculum is therefore re-inserted, and those parts dealt with by means of cutting forceps.

Finally, the septal wound-cavity is freed of chips of bone and cartilage, and of blood-clot, the flaps are allowed to fall together, and a packing of strips of sterilized gauze, impregnated with bismuth carbonate (StClair Thomson) and wrung out of liquid paraffin, is inserted into the nasal chamber on either side to prevent the formation of a hæmatoma between the flaps.

The packing remains *in situ* for twenty-four hours; it is then removed and not replaced unless there is hæmorrhage. The packing is very irksome to the patient. For this reason the writer places metal tubes (Fig. 117)



FIG. 117.—Author's Metal Tube, for use after submucous resection.

in the nose for breathing purposes and inserts the packing around them. The tubes are kept clear of blood and discharge by being swabbed frequently with hydrogen peroxide solution.

After-treatment is simple. When the packing is removed, the nose is douched with normal saline solution, and thereafter it is left alone.

The removal of the packing is always followed by more or less bleeding. The surgeon ought, therefore, to remain with his patient until he is sure that it has stopped. If it seems like continuing, a new packing should be inserted and left for another twenty-four hours. We ought to add that, apart from the discomfort of prolonged packing, it carries with it the risk of sepsis not only in the nose but also in the middle ear.

After the packing has been removed, a reactionary swelling of the turbinals comes on and leads to blocking of both sides; this continues during the healing of the wound for about a week or ten days, so that the

patient does not begin to appreciate the benefits of the operation for at least a fortnight.

The wound usually heals without any trouble, but convalescence may be interrupted by a rise of temperature usually from septic tonsillitis. (See p. 28.) This is due to septic infection from the nasal wound, and can be avoided by attention to asepsis before and during operation. It is best treated by antistreptococcus serum (20 c.c.) hypodermically.

Difficulties.—The operation presents many pitfalls and difficulties, which the operator must learn in time satisfactorily to circumvent.

Button-holing the flap is the most frequent accident, but it is negligible unless the button-hole extends during the operation and becomes a large gap. Sometimes, as when there is a sharp-edged or sharp-pointed spur, button-holing can scarcely be avoided, but in such cases one may prevent its occurrence by postponing the elevation of the muco-perichondrium along the summit of the spur until the cartilage around it has been removed, or the opposite plan may be adopted of raising the periosteum over the basal spur of the bone before undermining the septal perichondrium.

If a button-hole in one flap corresponds in position to a button-hole in the other, a *perforation* in the septum will be left after the wound is healed. The operation being planned to prevent such an eventuality, its occurrence, artistically speaking, is annoying, but, fortunately, such a perforation often gives excellent breathing-space, although it may also favour crust-formation. (See p. 291.)

The formation of synechiæ or adhesions is prevented by avoiding button-holing and by light-handed manipulation, so as to avoid ruffling the mucosa of the outer wall of the nose.

In *children* the operation is difficult. A general anæsthetic is required, as cocaine cannot be employed, and the action of adrenalin is only transient. As a result, the operator is impeded by the free bleeding and the necessity for continual mopping, while the small size of the parts and the restricted access cramp his manipulations and render the whole procedure tiresome and even irritating. As an offset to these drawbacks deflections in children are nearly always confined to the anterior part of the septal cartilage, and when the obstructing portion is removed there is no need to proceed any further.

Modifications.—No two nasal septa are alike, and each requires some special modification of the general plan.

Lateral Displacement of the Columnar Cartilage with Deviation of the Septum.—In this variety the anterior end of the septal cartilage is apparent, projecting into the vestibule of one nostril, while the convexity of the deflected septum lies as a rule in the opposite side of the nose. For this type two incisions are recommended. *A*, Down the anterior edge of the displaced cartilage in the vestibule, and *B*, on the opposite side further back on the convexity of the septum inside the nose. (See Fig. 118.) Through *A* as much of the displaced cartilage as projects into the vestibule is removed, and no more. Incision *B* gives access to the septum inside the nose, and

through it the rest of the operation proceeds as in ordinary cases, only cartilage lying posterior to incision *B* being removed. Thus, there is left in the middle line, between incision *B* and the wound *A* in the opposite vestibule, a strip or pillar of cartilage, and this serves to support the tip of the nose, which, if the operation were carried entirely from incision *A* right backwards, might show some flattening.

In general, when deflection angles are acute, when there are, as in traumatic cases, unexpected adhesions between perichondrium and cartilage, and in all difficult cases, the rule is, to be content with limited separations of perichondrium and piece-meal removals of cartilage and bone, proceeding step by step, and declining swift or spectacular progress.

Cautions.—Perfect hæmostasis is of the first importance.

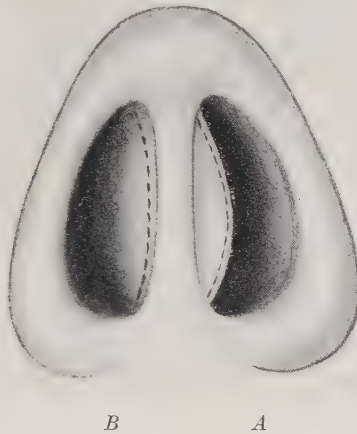


FIG. 118.—Submucous Resection of the Nasal Septum. (7) The double incision for cases with displacement of the cartilage at the columella.

Avoid removing the cartilage close under the bridge. Otherwise sinking of the bridge may ensue and some external deformity.

Avoid operating in active syphilitic conditions, as destructive ulceration and deformity may follow, for which the operator will be blamed.

The more perfect the adrenalin-hæmostasis, the easier is the operation.

It is generally agreed that the operation should not be performed on children under twelve unless unavoidable, as the growth of the nose may be stunted.

If one inferior turbinal has undergone hypertrophy, anterior turbinotomy in addition to the septum operation may be required to restore nasal breathing.

Submucous Resection of Spurs.—Sometimes an outstanding spur may be removed without resecting the septum itself. A vertical incision is

made in front of the spur, the mucosa of the septum covering it is elevated, and the underlying prominent cartilage and bone is removed by knife, forceps or saw.

The old method of sawing off these spurs as a whole is not recommended, as it may cause a large perforation, or leave an extensive scar to favour crust-formation.

The *Results* of submucous resection are pleasing, especially as regards nasal obstruction and its effects.

When the operation is performed for old-established deafness, however, as from chronic catarrh of the middle ear, striking benefit can scarcely be expected.

The establishment of free nasal respiration may have a beneficial effect upon such laryngeal diseases as chronic laryngitis, pachydermia, papilloma, and even tuberculosis of the larynx.

But we must add that many reliable authorities deny that resection of the septum exercises a beneficial effect upon laryngeal disease. The point is, indeed, unsettled, but the result probably depends upon the degree of the antecedent nasal obstruction. If the patient is entirely or almost entirely a mouth-breather the operation will probably do good. On the other hand, the removal of a septal deformity that is causing but a little nasal obstruction is not likely to confer any benefit upon laryngeal disease.

PERFORATIONS OF THE NASAL SEPTUM

are not uncommon, and may arise either from injury or from destructive disease of the septum.

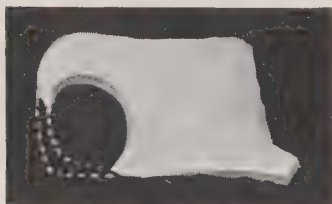


FIG. 119.—Cartilage of the Nasal Septum removed by submucous resection, showing fenestra. (For the specimen of which this is a drawing, I am indebted to Mr. C. Horsford.)

In **Simple Perforation** which affects the cartilaginous septum only, especially about Little's area (see p. 267), we have to deal with a perforation due, it is generally supposed, to simple ulceration from crust-formation and picking with the finger-nail. The long continuance of trivial injuries to the mucous covering of the septum produced by this habit initiates and keeps up a simple ulcerative process, which in time eats its way through the septum. (Fig. 119.)

The writer suggests that, before the septum perforates, its cartilage becomes fenestrated from pressure-atrophy induced by the dried mucous crusts adhering to the mucosa. (See also p. 267.) Nose-picking will induce ulceration and also epistaxis, but perforation is not produced, he believes, unless the cartilage has previously undergone fenestration.

The pre-eminence of dust-deposit in the aetiology of the simple perforation

is obvious, from the frequent occurrence of the defect in stonemasons and other workers in dusty surroundings, and if the dust be of a chemically irritating or destructive material, such as chromic acid or common salt (D. M.), its ulcerative and perforating properties are all the greater. Perforation of the septum likewise results from the habit of snuffing cocaine powder.

It is also apt to follow the injudicious application of the galvano-cautery or powerful caustics like silver nitrate to the cartilaginous septum.

It is characteristic of perforation from such causes (with the exception of the chronic acid type) that they affect the cartilaginous septum only. The stronger and more vascular osseous septum is able to resist them.

External injury, such as a blow on the nose, producing hæmatoma abscess of the septum (see p. 265), in consequence of which the cartilage of the septum undergoes dissolution, may lead to perforation, but as a matter of fact, although extensive cartilage destruction is common enough, perforation from this cause is relatively rare, since the muco-perichondrium remains intact—upon one side at least.

We have already seen that the submucous resection of the septum may cause perforation, but it is much less liable to happen than it used to be when spurs were sawn off entire.

Among the local destructive *diseases* that produce perforation of the septum, the commonest is syphilis, which may obliterate the whole of the structure, both bony and cartilaginous. It is, indeed, the distinguishing point between a simple and a syphilitic perforation that the former affects the cartilage of the septum only, while the latter attacks bone and cartilage, either indifferently or with a preference for bone.

Tuberculosis, lupus and cancer deposits on the septum lead to its perforation, but care should be exercised not to mistake a perforation due to those diseases for a perforation upon the edges of which those diseases are deposited. If a growth or nodule affects a segment only of the rim of a perforation which is otherwise cicatrized, then the perforation is the primary and the neoplasm or granuloma the secondary condition.

Finally, in gravely debilitating diseases, such as typhoid fever and diabetes, more or less of the cartilaginous septum may slough, and, if the patient recovers, a perforation will be left.

Symptoms.—A perforation of the septum may give rise to no symptoms whatever. On the contrary, its presence may actually be an advantage in providing more nasal space for respiration.

Otherwise the small, simple perforation sometimes makes its presence known by producing a whistling noise during inspiration—a symptom often very irritating to the patient. Larger perforations encourage crust deposit upon their edges, in consequence of which epistaxis may result. Finally, the extensive perforations of syphilis, by withdrawing from the bridge the support of the septum, are liable to be followed by falling-in of the bridge and deformity. Exactly how much of the septum need be lost to produce this deformity does not seem to be quite clear, and as great defects may

exist without deformity, there is perhaps no general rule governing its occurrence. But when the bony septum is involved, and when the cartilaginous septum close under the bridge is destroyed, deformity may be expected. The fact that it often delays its appearance until after convalescence in syphilitic cases suggests that the falling-in may be due chiefly to cicatricial contraction.

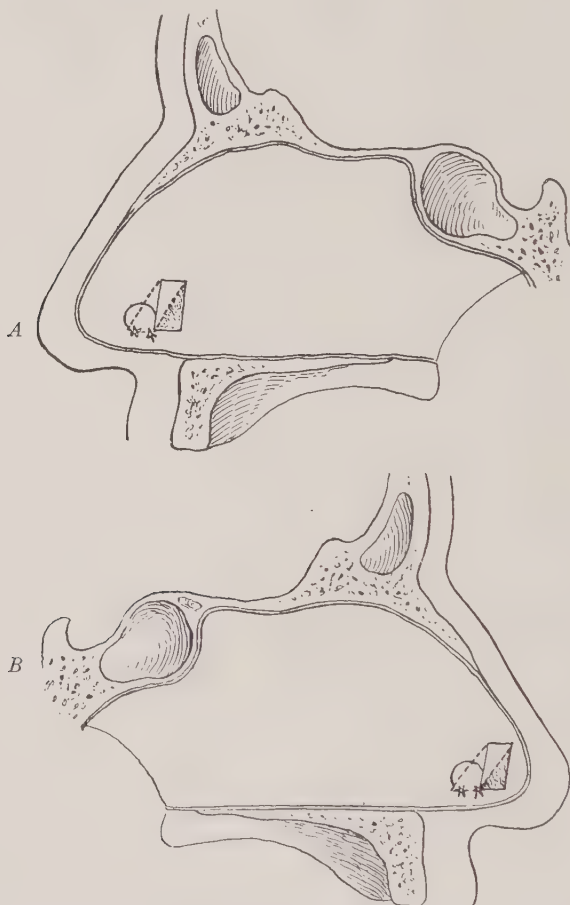


FIG. 120.—Closure of a small Simple Perforation of the Septum by alternate flaps.

Treatment.—The cause of the perforation must, of course, be removed, if that is not already in abeyance.

The perforation as such need not be interfered with if it is causing no symptoms. A whistling perforation may be cured by a plastic operation, or by enlarging the perforation, if the former is out of the question.

The **Plastic Closure** of small perforations is effected as follows :

The edge of the perforation is rawed. A flap of mucosa is cut on one

side, as in Fig. 120 *A*, slid *forward* over the perforation, and sutured with fine catgut into position. On the opposite side the flap is cut as in Fig. 120 *B*, slid *backward* over the perforation and sutured.

Large perforations cannot be closed, but their edges should be kept moistened with liquid paraffin or some simple ointment.

INJURIES OF THE NOSE AND EPISTAXIS

Fracture of the Nasal Bones is always the result of blows on the bridge of the nose, generally near the root.

The *Symptoms* are pain, swelling and deformity, and perhaps crepitation.

Immediately after the blow is received the deformity is visible, but it is soon masked by the swelling, which forms with very great rapidity, and it does not become obvious again until the swelling has passed away, by which time the fracture has united and the deformity is fixed.

The type of deformity depends upon the direction of the blow. If it falls directly on the bridge, the nasal bones are broken more or less transversely, and the bridge is flattened and widened. If it falls to one side or the other, the nasal bones are broken obliquely, and the bridge presents lateral displacement, usually with the *convexity on the same side that the blow was received*, and the flattening on the opposite side.

With the fracture of the nasal bones and their displacement, there is always associated a bending or a fracture of the septum, either of the cartilaginous or of the osseous portion or of both, and the septal lesion is frequently associated with the formation of septal hæmatoma, which, like the external swelling, conceals for a time the presence of the septal deformity.

Fracture of the perpendicular plate of the ethmoid may be an accident of the utmost gravity if the force has been sufficient to cause fracture also of the cribriform plate, and the opening of the anterior cranial fossa. But the force necessary to inflict injury so deep must be very great.

Hæmatoma and Abscess of the Septum.—Hæmatoma of the septum results from a blow on the nose. It shows as a dark red swelling of the septum, frequently bilateral.

Search in these cases should be made for signs of fracture of the septum and of the nasal bones. If left *in situ* the effused blood is slowly absorbed, and then the fracture, if present, may for the first time become evident in the deformity of the septum.

Occasionally it happens that these blood swellings are transformed into abscess from infection through the intact mucous membrane. The swelling then increases, becoming tense, bright red, very tender, and it is associated with constitutional disturbance. Liquefaction of the cartilage with the formation of a large fenestration may ensue, as a result of which the deformity of the nose is likely to be aggravated.

Treatment of Fracture of the Nose.—Far too little attention is paid to this injury.

1. If seen immediately after the injury is received, while the deformity is still visible, the patient should be anæsthetized, and efforts made to rectify, first of all, the external deformity by external manipulation, aided if necessary by padded elevators and similar flat instruments passed inside the nose. It will generally be found that once the displaced fragments are replaced they will remain in their natural position without any artificial aid, as they are not acted upon either by gravity or by muscular action as are the bones of the limbs. The septum should also be straightened if possible, and sterilized gauze plugs should be inserted into the nose, as is done after submucous resection, in order to prevent the formation of hæmatoma of the septum. The packing may be retained for several days, as its presence is not intolerable, but hæmatoma of the septum is less prone to develop after forty-eight hours.

2. When the external swelling has appeared before the case is seen, X-ray examination may give some information as to the site and nature of the fracture and displacement, but skiagrams of the region in question are not easy to interpret.

It is possible, however, to mould the fragments from without into good position as late as a week after the injury.

3. If the septum is occupied by a hæmatoma, an incision should be made under local anæsthesia through the mucosa as if for the submucous resection, and the blood and blood-clot entirely evacuated. The long-bladed speculum is inserted, or the finger may be passed into the cavity, and the state of the septal cartilage and bone investigated. If they are found to be fractured and displaced, attempts should be made to readjust the deformity, the nose being finally packed as after submucous resection.

4. If hæmatoma-abscess has formed by the time the patient is first seen it should at once be opened, and the contents evacuated, fragments of cartilage and bone that may be present being removed, as they will no longer be viable. Packing is not employed, as the cavity must be allowed to drain.

Such deformities as are then present must be dealt with after recovery, as outlined on p. 247.

Epistaxis, or nose-bleeding, is caused by (1) injuries from blows, etc.; (2) surgical operations on the nose; (3) local affections, such as ulcers, simple or malignant, membranous rhinitis, foreign bodies, etc.; (4) systematic affections, typhoid and other fevers, anæmia, hæmophilia, purpura, and diseases characterized by high arterial tension, such as Bright's disease, atheroma, hepatic cirrhosis, etc.

Traumatic Hæmorrhage.—The nasal mucosa is richly vascular, and nose-bleeding is probably the commonest of all hæmorrhages. When caused by a blow, the bleeding from an otherwise healthy nose, though lively for a time, usually comes quickly to a standstill either spontaneously, or after such homely remedies as the retention of the upright position, the elevation of the arms and the application of cold to the face. The operating surgeon,

however, frequently finds it necessary to adopt artificial measures to control hæmorrhage both during and subsequent to operations on the nose.

In apparently *Spontaneous Epistaxis* the usual site of bleeding is on the anterior inferior angle of the triangular cartilage—a spot where the bleeding point is easily seen. At this spot, which is known as *Little's area*, a small anastomotic vessel runs which is liable to be wounded in the detaching by the finger-nail of the fine mucous crusts that tend to adhere about this part; or the vessel may be broached by a shallow simple ulceration that readily forms here; or it may rupture and the bleeding break out spontaneously.

The amount of blood that can be lost from such a minute vessel is surprising, and when actually confronted with a lively epistaxis, the patient bleeding freely and apparently from both nostrils, it seems absurd to suppose that only this small vessel should be the sole source of the flow. Nevertheless, in 99 per cent. of the cases of epistaxis this is the site of bleeding, and here it may at once be stopped.

When due to a constitutional disorder, the hæmorrhage sometimes springs from several points at once, and it may be impossible to locate them. Frequently recurring attacks of epistaxis, a local cause being absent, should lead to an examination of the patient for signs of Bright's disease or hepatic cirrhosis. In such cases, epistaxis is often credited with being a safety-cock, relieving high tension in the circulatory system, and perhaps in this way postponing or preventing the rupture of an artery in the brain. There is some truth in this belief, but the practitioner should not allow the safety-cock to continue running too long and become a dangerous leak, or his patient will exchange a potential for an actual peril.

It should be remembered that recurrent epistaxis is also one of the usual signs of malignant disease in the nose. (See p. 305.)

Prognosis.—In the vast majority of cases epistaxis is arrested by homely measures. The doctor is only summoned when such measures fail, and as a rule his treatment succeeds in bringing the flow to a standstill. But cases occur, belonging for the most part to the fourth group mentioned above, in which great difficulty is experienced in checking the hæmorrhage. Those are the cases the rhinologist most frequently sees. In those circumstances the patient may become seriously blanched, but, although fatalities do occur, epistaxis, even of this type, is seldom a direct cause of death. What is more common, however, is that the patient, weakened by loss of blood, falls a victim to the constitutional malady which started the hæmorrhage, or to some other disease. Septic infection of one or both middle ears, *e.g.*, an occasional sequel to plugging the posterior nares, is particularly to be dreaded in such debilitated subjects. The moral is: take steps to arrest the bleeding before the patient has become exsanguinated.

Treatment.—The indication is to find the bleeding spot, and seal the vessel.

In most cases this can be done by pressure applied upon Little's area,

and even pressing in the flaccid ala nasi upon the septum may be sufficient. The patient can do it for himself.

When the bleeding is in progress, examine the nose with the aid of mirror and speculum, mopping the blood dry with sterile gauze.

If the bleeding spot is situated in Little's area, apply to it a tampon of cotton-wool, soaked in sol. adrenalin (1-1000), and held in apposition with a firm packing of gauze in the vestibule and floor of the nose.

Remove this in five minutes, and the bleeding will be found to have stopped, so that you can inspect the vessel. Dry the surface by mopping with gauze, and apply along the course of the vessel by means of a cotton-tipped probe a 50 per cent. sol. argent. nitrat. in aq. The solid crystal may be used upon the osseous part of the septum, but it is too strong for the cartilaginous septum, and may induce its perforation.

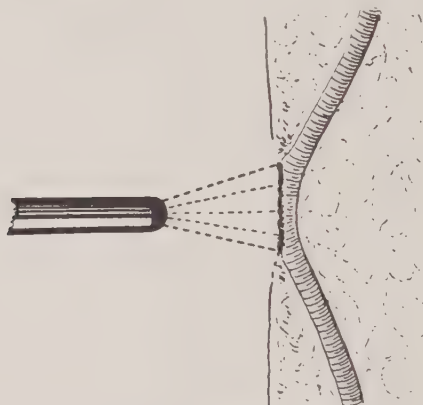


FIG. 121.—Fulguration with Diathermy Terminal. Note terminal approximated to, but not in contact with the bleeding spot.

The galvano-cautery point, at a dull-red heat, may be employed instead of the chemical caustic, but it is more difficult to control, and it is apt to start the bleeding again. Fulguration with the diathermy terminal may also be used (Fig. 121). Both of those methods are liable to produce a perforation of the septum if applied over the cartilaginous area.

The nose should never be plugged as a whole for bleeding from Little's area.

When, as is often the case, the ulcer or abrasion on Little's area is secondary to a deviation of the nasal septum, and to the consequent drying of mucus thereon, correction of the deviation (see p. 253) is the best method of preventing recurrences of the hæmorrhage.

When hæmorrhage seems to be springing from the upper regions of the nose, and the bleeding-point cannot be seen, these upper regions can be securely packed off with ribbon-gauze inserted under inspection, and the inferior meatus left free of packing, and *vice versa*.

Hæmorrhage from operation wounds is dealt with on the same principle : the packing is applied to the region affected. (See p. 242.)

The control of epistaxis by a plug in the posterior and one in the anterior naris, the nasal cavity and its sinuses being allowed to fill with blood, is a blind and blundering method of treatment.

The posterior naris may be plugged for bleeding after removal of adenoids or of the posterior end of the inferior turbinal, but when it is, no other plug should be needed.

In ordinary epistaxis, plugging of the posterior nares should always be avoided if at all possible, since, as we have already said, it is apt to induce septic infection of the middle ear. If unavoidable, the safest plug to use is a small-meshed marine sponge wrung out of weak carbolic solution and attached to a piece of tape or string, which hangs out of the mouth after its insertion. The sponge is inserted into the naso-pharynx through the mouth. If pressed well home it will remain comfortably in position. Except in little children the naso-pharynx is roomy, and will accommodate a sponge the size of a Tangerine orange without difficulty.

Passing a string through the nose, round the palate and out at the mouth in order to fasten a plug in the naso-pharynx is scarcely ever required. If deemed necessary, the simplest plan is to pass the string through a gum-elastic urethral catheter with the blind end cut off. The catheter containing the string is passed along the floor of the nose to the naso-pharynx, whence it will emerge from behind the soft palate. The end of the string is then seized, brought out at the mouth and held, while the catheter is withdrawn from the nose and taken off the string. A plug—of sterile gauze, boric lint, or whatever material is preferred—having been tied to the oral length of the string, can be guided with the finger into the naso-pharynx, and secured by tying the two external ends of the string over the lip.

Bellocq's cannula, a popular instrument for threading the nose and naso-pharynx, is ingenious, effective, and—painful.

DISEASES OF THE VESTIBULE OF THE NOSE

The vestibule being lined with skin, it is liable to skin disease.

Eczema of the vestibule is caused by irritating nasal discharges—as in a mild and transitory form, from acute coryza, and, more severe, in nasal diphtheria. It is also seen sometimes in paroxysmal rhinorrhœa and other conditions that produce a free flow of liquid from the nose, and the writer has reported its occurrence as a result of spraying the nose with strong solutions of menthol.

The *symptoms* are those of eczema elsewhere with a special tendency to the formation of painful fissures, for which reason care must be taken not to open the blades of the examining speculum as wide as usual.

Treatment.—The cause must be removed, after which the skin of the vestibule may be treated with—

R Ichthiol	10 per cent.
P. Zinc. Oxid.	gr. xx.
Vaselin, ad.	℥j.

If there is much infiltration and fissures are deep and sore, the vestibule should be first of all painted with sol. argent. nit. (gr. xx to ℥j).

Small fissures in and about the vestibule, particularly in the recess under the tip of the nose, form a favourite portal for the introduction of the *erysipelatos infection*, and people subject to recurrences of facial erysipelas will be found nearly always to owe their attacks to a breach of the surface in this situation. Hereabouts also, in many cases, is to be found the first deposit of the lupus nodule in lupus attacking the skin of the face. (See p. 301.)

Syphilis affects the vestibule in two forms. First of all, the primary chancre, from finger infection, may appear in the vestibule as a chronic sluggish infiltration coming, if untreated, to produce great swelling and deformity of the parts. The slow progress, the obstinacy to simple remedies and the enlargement of submaxillary lymphatic glands should lead to diagnosis. (See also p. 297.)

As a late secondary or tertiary lesion, symmetrical *ulceration of the vestibule* both of the interior and of the borders of the alæ and adjoining surface of the upper lip occasionally appears. It readily yields to treatment if recognized in time, but may be mistaken for simple eczema, and lead to loss of tissue and to deformity before the error is rectified.

Furunculosis of the vestibule is not uncommon, the boil being situated in a hair-follicle. It gives rise to heat, pain and swelling, and runs the usual course of furunculosis, with the tendency to indefinite recurrence either locally or elsewhere.

A furuncle in the vestibule of the nose may lead to fatal thrombosis of the cavernous sinus, the infection passing through the veins of the nose and face to the orbital veins and thence to the cavernous, as in a case recently reported in detail by A. Logan Turner and F. E. Reynolds ('Journ. of Laryng.', vol. xli, p. 73).

If seen in an early stage, the boil may be aborted by carefully puncturing the centre with a hypodermic needle, and injecting a minute quantity of pure phenol. The needle should not penetrate beyond the zone of subcutaneous infiltration. It is a painful treatment, but effective.

Once the boil is formed, incision and curetting under an anæsthetic is recommended.

Prevention is best secured by the local daily application of ungt. hydrarg. oxid. flav.

In obstinate cases a stock staphylococcus vaccine may be tried. Manganese collosol, administered by intramuscular injection, is highly recommended. The urine should be examined for sugar.

Cyst of the vestibule: The outer part of the floor of the vestibule is occasionally the seat of a thick-walled cyst of doubtful nature and origin. Some writers suggest that it may be a retention cyst arising in connection with certain glands with long ducts found in this region, but the possibility of some developmental origin is obvious. It has no connection with the teeth, as far as is known, and is distinguished from the dental cyst in lying quite outside the bone of the upper jaw.

Vestibular cysts vary in size from that of a pea to that of a bantam's egg. Their original site is in the middle or outer half of the floor of the vestibule, but as they grow they extend back as far as the anterior end of the inferior turbinal and down into the incisor fossa. (A. Brown-Kelly, 'Journ. of Laryng.,' June, 1898.) In one case under the care of the present writer the cyst had extended upwards, and was found lying in contact with the outer edge of the pyriform opening.

Treatment.—When small the cyst may be removed through an incision in the floor of the vestibule, but when large it is more easily reached through an incision in the gingivo-labial recess, the soft parts being dissected up until the cyst is exposed. So intimate is its connection with the skin of the floor of the vestibule that difficulty may be experienced in separating it without wounding the skin.

Rhinophyma is the name given to the unsightly nodulo-bulbous hypertrophy of the skin of the exterior of the nose, which is due to an adenomatous overgrowth of the sebaceous glands, and is met with as a sequela to the severer forms of acne.

It is best treated by operation. Under a general anæsthetic, the redundant skin and tissue is freely shaved off, sufficient being removed to reduce the organ to something like its pristine dimensions. Hæmorrhage is not excessive, and the raw surface readily heals without skin-grafts, although many surgeons do make use of them.

DISEASES OF THE INTERIOR OF THE NOSE

ACUTE CATARRHAL RHINITIS (INCLUDING EPIDEMIC CATARRH ; ACUTE CORYZA ; "COLD IN THE HEAD" ; ACUTE PURULENT RHINITIS)

Epidemic Catarrh.—The importance of epidemic catarrh as the starting-point of many serious diseases of the nose, throat and ear can scarcely be over-estimated. Hitherto, far too little attention has been paid by epidemiologists to this widespread endemic disease, the sequelæ of which entail much ill-health, suffering and disablement.

Ætiology.—The disease is an infectious malady, travelling from one person to another by contact. The bacterial cause is probably unknown, as from four to six micro-organisms are variously blamed for its occurrence. Clinical and personal experience, however, proves beyond doubt that the distribution and the occurrence of the disease is occasioned, in present conditions, less by an omnipresent organism than by the varying degree

of resistance in the individual. Some people enjoy a life-long immunity from the disease ; others never seem to be free of it. But the majority of people are attacked about twice a year—roughly, every six months. That is to say, the immunity conferred by one attack is exhausted in about six months' time.

It seems also to be the case, however, that a permanent immunity is ultimately acquired by those who are susceptible to the infection, as one frequently learns from patients that as years go on, the attacks become less frequent and less severe until they finally disappear. But it unfortunately is often the case that by the time the immunity is acquired, the patient has already become the victim of the serious secondary effects of the disease, such as deafness, nasal sinus suppuration and polypus formation, or chronic bronchitis and asthma.

The old belief that epidemic catarrh is due to exposure to cold requires modification in the face of the facts that it is found in all climates, and at all seasons of the year indifferently. The feeling of shivering in the early stages is an effect, not the cause of the disease. While it is true, moreover, that prior to the days of modern rhinology, many conditions were believed to be "colds" which we now diagnose as specific nasal and naso-pharyngeal diseases, still, it is probably also the case that sufferers from such chronic diseases as sinus suppuration and adenoids are more susceptible to the infection, and more frequently attacked by it than are individuals whose upper respiratory passages are healthy. Such patients frequently fall victims, either because the local resistance in the nose is reduced by the chronic disease, or because the recurring attacks of "catarrh" are due, not to the epidemic virus, but to a temporary rise in virulence of septic organisms already resident in the nasal sinuses, or in the adenoids.

Chronic rhinitis from whatever cause arising—deviations of the septum ; polypi ; sinus suppuration—frequently becomes acute from slight causes, and in this condition it probably is true that a chill from exposure or getting wet is sufficient to precipitate active symptoms, sometimes even with pyrexia.

In children, frequent "colds" are almost invariably the result of adenoids, the chronic sepsis of which becomes acute on slight provocation, or without any provocation at all.

Apart from the virus of epidemic catarrh, and the effect of such diseases as those we have just mentioned, symptoms of acute rhinitis occur also as prodromal or early phenomena of the *exanthemata*, especially of measles and whooping-cough. True influenza also may produce acute nasal catarrh, but the ordinary epidemic nasal catarrh is undoubtedly a disease quite distinct from influenza.

A severe gonococcal rhinitis in newborn infants is described.

Finally, acute rhinitis may be induced by exposure to irritating gases, vapours and dust ; and by taking iodides internally.

Thus, the group of symptoms known as "acute catarrhal rhinitis" or "acute coryza" may be due to a large number of different causes.

Pathology.—Catarrh of the mucous-lined cavities of the upper respiratory tract is a surface infection, and the inflammatory reaction extends to no great depth—at all events, in simple and early cases. The reaction produces congestion and swelling of the mucosa with a surface exudate of thin, watery secretion mingled with pus-cells. The secretion of the mucous glands is diminished in the early and increased in the later stages.

Symptoms: Epidemic Catarrh.—The disease begins in one circumscribed area, in the naso-pharynx or nose or larynx, and spreads from it. Victims of the disease know by experience when an attack is beginning, the affected locality, which is at first quite small in extent, being the seat of a peculiarly characteristic irritation.

When the larynx is selected, the symptoms develop into acute catarrhal laryngitis (see p. 110), but the nose, in such cases, also becomes affected.

When it starts in the nose or naso-pharynx, it sets up, during the first twenty-four or forty-eight hours, nasal stuffiness from turbinal swelling; with acrid nasal watery secretion; fullness in the head and ears; and general malaise, the last varying in severity with the extent and intensity of the local phenomena. Any remedy which relieves the local conditions benefits the general. But the constitutional disturbance is more subjective than objective, for although the skin is hot and dry, and the pulse a little increased, yet the temperature is seldom raised in uncomplicated cases, and appetite for food is unchanged or increased.

The signs of inflammation tend to involve the nose, larynx, trachea and bronchi, and may last from two to six weeks in a susceptible subject or in a neglected case.

According to the classical description of acute catarrh, the first period of scanty secretion is followed by a period of profuse watery discharge, and this by a period of purulent discharge, but in reality such clear distinction is seldom attainable, for the discharge varies in character and in quantity from hour to hour.

The period of recovery, which is liable to interruption by relapses, is marked, however, by the purulent nasal secretion becoming more copious and more mucous in character, and finally by its drying up. During all the stages, the loss of vaso-motor control of the turbinals from the action of the bacterial toxins upsets the balance of turbinal function, so that at one moment the nose is unduly patent and streaming with watery secretion, and at the next it is absolutely blocked and dry. The latter condition is most noticeable and persistent when the patient is recumbent, and it interferes both with rest and sleep.

The complications of acute epidemic catarrh include laryngitis (see p. 110), tracheitis and bronchitis; acute suppuration of the nasal accessory sinuses (see p. 329); acute catarrh and suppuration of the middle ear; while among its sequelæ we find chronic and hypertrophic rhinitis, and chronic exudative catarrh of the middle ear, with all the consequences of these conditions.

The symptoms of the other varieties of catarrh are less severe and

persistent than those we have just been describing—that is to say if the cause is removed.

Diagnosis.—True epidemic catarrh should not be confused with the acute exacerbation of nasal sinus suppuration or with adenoiditis in children.

There is no such disease as a “chronic cold.” When catarrhal symptoms are chronic, the nose or naso-pharynx is the seat of real disease, the most usual being ethmoiditis in adults, and adenoiditis in children.

Prognosis.—In aged and debilitated persons, an attack of acute catarrh is dangerous; in sufferers from chronic bronchitis and asthma, it means a serious temporary aggravation of all their symptoms, and the same applies to patients with chronic nasal sinusitis and middle-ear disease. Thus, deafness is always made worse by a cold, and the loss so sustained may not be restored, while patients who have been operated on for nasal sinus suppuration frequently experience a recurrence of their old symptoms during acute coryza. Finally, the liability to reinfection during catarrhal attacks renders it important to shut off the mastoid operation cavity from the naso-pharynx by a sealing up of the Eustachian tube.

Treatment: Preventive.—The infection of epidemic catarrh is probably most lively in the early stages of the attack, and during that period the patient ought, if possible, to be isolated. At the present day such an injunction will not be followed, but the future will certainly see attempts made to control an infectious disease which at present is a cause of much unnecessary morbidity, and, indirectly, of much mortality.

The patient, however, can attend to the following rules:

He should avoid close contact with other persons, as in kissing.

The spraying of his environment with droplets of saliva as he is speaking can be prevented by his wearing a light veil or mask of cotton over the mouth.

Nasal discharges, being highly infectious, should be blown into paper or rag handkerchiefs and burned.

And cups, spoons, and other vehicles and vessels used by him should be sterilized.

Curative.—An attack can sometimes be aborted if, soon after the prodromal irritation in nose or nasopharynx is first felt, the nose is freely syringed with warm, sterilized, normal saline solution.

At the same time, as the writer can testify from personal experience, homœopathic doses of iodine will frequently cut short the attack, if taken as soon as the initial symptoms appear. The formula is—

R	Iodin. Pur.	.	.	.	.	.	.	.	1 per cent.
	Potass. Iodid.	.	.	.	.	.	.	.	<i>q. s.</i>
	Aq.	.	.	.	.	.	.	.	$\overline{3j}$
									M.

Sig.: One drop in a wineglassful of water every 24 hours.

(The potass. iodid. is added to dissolve the iodine. The dose should not be exceeded.)

Syringing the Nose—Nasal Lavage.—After the disease has become fully developed, nasal syringing twice daily with warm saline, or, if the discharge is thick, with $\mathfrak{z}$ iv. of—

R	P. Potass. Chlor.	.	.	.	.	.	.	3 iv
	P. Sod. Bibor.	.	.	.	.	.	.	5 iv
	P. Potass. Bicarb.	.	.	.	.	.	.	3 iv
	P. Sacch. Alb.	.	.	.	.	.	.	3j
								M.

in a pint of warm water is very soothing to the irritated and inflamed mucous passages.

A syringe on the Higginson principle alone should be used for nasal lavage, and the Wyatt Wingrave or Mayer and Phelps pattern can be recommended. (Fig. 102.)

Sniffing liquid up into the nose is dangerous, as the Eustachian tubes are opened thereby, and the fluid is apt to find its way into the middle ear.

Douching the nose from a raised reservoir of fluid is harmless but ineffective, as the pressure is insufficient to dislodge sticky mucus. Douching by means of the nose-boat is equally futile.

The plain glass syringe of the shops is better than these, but it is much less effective than the Higginson pattern.

Method.—A large and a small bowl or basin are required. In the small one the solution, which should be fairly warm (100° F.), is placed, together with the end of the syringe. The patient stands or (better) sits with head held forward over the larger basin. The nozzle of the syringe is inserted into one side of the nose, being laid along the floor of the vestibule, and not so far in as to come into contact with the sensitive nasal mucosa. The stream is directed first straight back along the floor of the nose, and later upwards and backwards towards the ethmoidal region. During syringing the patient keeps the mouth well open, and must not raise his head. After one side has been syringed, the nozzle is transferred to the opposite vestibule in order to syringe the other side.

The patient should be taught to do this for himself; he is quickly warned by pain if he syringes too vigorously, or if the fluid finds its way into some recess under too high pressure. After syringing, the nose should be freely blown *with open nostril*.

The syringe should be sterilized after use, and hung up by its end.

Constitutional Treatment.—The folk-medicine of the world is rich in remedies for “a bad cold,” and they have for the most part one common principle, and that is free perspiration.

A hot bath, a hot drink, and a retirement between blankets in company with one or two hot-water bottles, without any other treatment, is enough to turn a bad cold into a mild one. After the perspiration has continued for a few hours, the patient should be rubbed dry, and clothed in dry flannels. Otherwise, a chill may follow the sweat, and while it is true that acute catarrh is not caused by cold, it is, nevertheless, also true that, once

it has set in, a chill, or exposure to cold, like anxiety and other depressing circumstances, will aggravate its symptoms.

The treatment of the other forms of catarrh is symptomatic, but the removal of the cause in secondary acute catarrh must not be omitted.

MEMBRANOUS RHINITIS

Rhinitis with watery discharge, nasal obstruction, and the formation of false membrane may be (1) diphtheritic or (2) non-diphtheritic.

Nasal Diphtheria we have already considered. (See p. 38.)

Non-Diphtheritic (Simple or Septic) Membranous Rhinitis is not uncommon. The infection is usually pneumococcic, but the other pyogenic organisms may also induce the formation of false membrane in the nose.

Symptoms.—The constitutional symptoms are mild, and the patient's usual complaint is stuffiness in the nose with serous or purulent discharge. On examination, the membrane, usually fawn-coloured and fairly tough, is easily seen, being especially conspicuous on the septum.

The *Diagnosis* from diphtheria depends almost entirely on the bacteriological findings, but if the patient has a raised temperature, the membranous rhinitis is probably non-diphtheritic.

The *Treatment* is that of simple acute rhinitis.

A membranous rhinitis sometimes accompanies tertiary syphilitic lesions in the nose, affecting the mucous membrane in the neighbourhood of the gummatous deposit or ulcer.

CHRONIC RHINITIS

Two varieties of chronic rhinitis are distinguished :

1. Simple chronic rhinitis.
2. Hypertrophic rhinitis.

(We exclude rhinitis sicca and atrophic rhinitis from this category.)

Simple Chronic Rhinitis arises from frequently recurring attacks of acute rhinitis ; from constant exposure to cold winds as in motor-driving ; from irritating vapours and dust ; from excessive tobacco-smoking and inhaling ; and possibly from constitutional disorders such as gout and rheumatism.

It is practically always present in cases of adenoids, in nasal sinus suppuration, and it is predisposed to and perpetuated by obstructing deflections and spurs of the nasal septum.

Symptoms.—Nasal obstruction is the chief complaint and it is generally of the alternating type ; that is to say, when one side of the nose is blocked, the other is free. In the lateral recumbent position, the lower nostril is always that which becomes blocked.

On examination, the inferior turbinates may appear to be normal, with nothing visible to account for the patient's complaint, or they may be a little swollen and congested. On the application of cocaine, however, all the swelling disappears, and the turbinates shrivel up against the side of the

nose, so that we can get a clear view straight back to the naso-pharynx. This shrivelling up, which proves that the engorgement of the turbinals is active and not passive—not due to oedema or hypertrophy—serves to distinguish simple chronic rhinitis from hypertrophic rhinitis.

Examination for possible causes of the disease should be made, such as adenoids, a deflected septum, sinus suppuration, and so on.

The *Treatment* consists in the removal of the cause, and then the rhinitis will get well of its own accord. If the cause cannot be found, the inferior turbinals may be lightly cauterized with benefit. (See p. 279.)

Vaccine Treatment of Nasal Catarrh.—Chronic rhinitis, and, more particularly, the frequently recurrent type of acute rhinitis, so long as they are not due to any of the local causes such as sinusitis, etc., are often benefited by vaccine treatment.

Sometimes an autogenous vaccine, grown from a swab applied to the nasal or naso-pharyngeal mucosa, answers best. Sometimes a stock vaccine, containing the *Micrococcus catarrhalis*, the influenza bacillus, the pneumococcus, and perhaps a staphylococcus, seems to do more good.

There are so many methods of dosage advised that no hard and fast rule can be laid down, but the general custom is to begin with small doses and work up until a definite reaction is obtained. The intervals between doses vary from four or five days to a fortnight, and in number from four to six.

Protection, when it is obtained, is but short-lived, and the vaccine has to be repeated every six months or year, according to the case.

The results are, as a matter of fact, extremely variable. Sometimes a prolonged period of immunity is secured; at other times no benefit accrues. Nevertheless, in spite of the uncertainty of the treatment it should always be tried, provided, as we have already said, that no local focus of infection in adenoids, sinusitis, etc., is present.

(For vaccine treatment in sinusitis, see p. 382.)

HYPERTROPHIC RHINITIS

The essential pathological features of this form of rhinitis are a permanent dilatation of the venous sinuses of the inferior turbinal from mucoid degeneration of the unstriped muscle-fibres of the inferior turbinal (Wyatt Wingrave), and a hyperplasia of the submucous tissue. In consequence, the application of cocaine to the turbinal is followed by little or no shrinking.

A further stage in the disease consists in the increase of fibrous tissue at the expense of the venous sinuses, and then the hypertrophied turbinal frequently presents a moriform, mammillated, or even papilliform appearance, especially on its posterior portion, when the post-rhinoscopic picture of the large greyish mulberry-looking posterior end is very characteristic. The mucous covering of the middle turbinal bone often participates in the hypertrophy, and by a further increase through the absorption of water frequently becomes transformed into true *mucous polypi*. (See below,

p. 281). The swelling of this body in the narrow space of the middle meatus may give rise to severe pain at the root and bridge of the nose.

The mucous membrane of the turbinals is frequently much paler than normal, and the mucous secretion is thick and tenacious, giving rise to much hawking and spitting when it passes into the naso-pharynx.

The constant nasal obstruction, frequent frontal headache and fullness in the head, with, perhaps, tinnitus and a degree of deafness from concomitant Eustachian obstruction, occasion the patient much annoyance. Reflex disturbances, such as cough, asthma, bronchitis, and the familiar train of maladies which attend upon nasal obstruction, are frequent results of this troublesome condition.

Any form of simple rhinitis, when long-continued, is liable to end in hypertrophic rhinitis, and the same is true of vaso-motor rhinorrhœa. (See p. 316.) Above all it should be remembered that the irritation produced by the constant presence of pus in the nose from a suppurating accessory sinus is a frequent cause of hypertrophic and oedematous changes in both turbinals. On the other hand, in hypertrophic rhinitis with its oedematous swellings and polypus formation, we have a condition which interferes to a great extent with the normal drainage of the accessory sinuses, and which, therefore, is liable to lead to purulent sinusitis of one or more of these cavities. While this is true, however, it is also true that many patients suffer from hypertrophic rhinitis with polypus formation lasting for years without any purulent sinusitis developing.

A considerable number of such cases of hypertrophic rhinitis are people who eat and drink too much ; or who smoke excessively, or who use snuff ; as well as men exposed to rigours of weather, such as locomotive engine-drivers, motor-drivers and country doctors.

Climate influences its occurrence. It is very common in Scotland, Canada and the Northern parts of the United States.

It is to be noted that there is no pus secreted from the general mucous membrane of the nose in simple or in hypertrophic rhinitis. If, therefore, pus is present in the nasal discharges, there must be some focus of suppuration, generally in a sinus, for which a search ought to be made.

Deviations of the nasal septum, with or without spurs, causing unilateral obstruction, are generally accompanied by hypertrophy of the inferior turbinal on the concave side ; mucous polypi are also common effects of the deviation, but they usually appear first, and occur most plentifully on the convex side of the septum. (See also p. 252.)

Prognosis.—If the cause can be removed, and the bulk of the turbinals artificially reduced, cure may be promised. But the secondary effects of hypertrophic rhinitis, such as catarrhal deafness, asthma and bronchitis, are apt to persist in spite of the removal of the nasal disease.

Untreated, or inefficiently treated, hypertrophic rhinitis passes gradually from bad to worse, and may actually introduce maladies which cut life short.

Treatment.—First of all, the cause or causes of the disease must be

sought for and removed, while at the same time the hypertrophies causing the nasal obstruction and interference with sinus drainage are reduced or removed. This entails, first, the reduction in size to its normal dimensions of the hypertrophied inferior turbinal; and secondly, if polypi are present, these must be radically cured.

The septum, if deflected, is straightened (see p. 253); adenoids are removed; suppurating sinuses are drained; and the patient's life and habits regulated.

Reduction in the size of the inferior turbinal may be secured in the slighter cases by cauterization, but the more fully developed hypertrophies will require operative removal.

Cauterization of the Inferior Turbinal.—That part which is hypertrophied alone should be cauterized, and as little damage as possible should be done to the mucous surface of the turbinal. Cauterization, as a matter of fact, is much less frequently performed than it used to be, chiefly because its benefits are rather evanescent. The galvano-cautery alone is recommended.

Method.—The turbinal is anæsthetized by means of cocaine-adrenalin solution on cotton-wool. (See p. 240.)

With a fine, sharp knife, a puncture is made into the most bulbous and fleshy part of the anterior end of the turbinal. A sharp-pointed sterilized galvano-cautery terminal is selected, and passed cold into the puncture just made. With the current on it is then carried as far back as is necessary, being kept under the mucosa throughout. Finally, it is withdrawn by the same route as it was inserted. Contact both with mucous membrane and with bone should be avoided, as a surface sore will follow the former and some bony necrosis may follow the latter.

The puncture-opening is now touched with a cotton-wool-tipped probe dipped in pure alcohol. Finally, a dressing is applied and retained for a couple of hours, of a cotton-wool swab, moistened in sol. phenazon (10 per cent. in water), in order to restrain the reaction.

(The usual method of searing the open surface of the turbinal with the incandescent terminal is not recommended, as it destroys unnecessarily a large area of the ciliated mucous membrane.)

Both inferior turbinals may be cauterized at the same sitting, but as the reactionary inflammation often leads to a blockage of the nose, it is less trying for the patient to have only one side done at a time.

Cautions.—Do not cauterize the posterior end, as middle-ear suppuration may follow.

Avoid contact with the septum, as that may lead to a cicatricial adhesion between the septum and turbinal (synechia).

No attempt should ever be made to cauterize the middle turbinal.

Results.—The reaction comes on about half an hour after the application with a discharge of thin blood-stained serum and a slight sense of burning. Turbinal swelling follows and blocks the nasal passage for three or four days; then it gradually subsides, leaving the nose much more patent than before.

The turbinal, if inspected, is now seen to present a furrow corresponding with the track of the heated needle. This in time cicatrizes, and as the cicatrix is adherent to the bone, the turbinal will remain small for a considerable period. A re-application in a year or eighteen months is, however, usually required, as the effect of the cauterizing on the turbinal turgescence passes off.

Operative Reduction of Hypertrophy of the Inferior Turbinal (Inferior Turbinotomy).

The preparations for these operations are the same as for the submucous resection of the septum. (See p. 253.)

The same caution must be observed as in cauterizing not to remove any more of the turbinal body than is really necessary to provide sufficient airway. Otherwise, its physiological value being reduced, the evil of a too patent nasal passage will be substituted for the evil of a blocked airway. On the other hand, no hesitation need be felt in sacrificing redundancies and hypertrophies. Physiologically, the most important parts of the inferior turbinal are its anterior and its posterior ends.

(a) *Anterior Turbinotomy.*—Under cocaine-adrenalin paste anæsthesia the anterior end at its junction with the lateral wall of the nose is snipped through with a pair of nasal shears as far as, but not into, the bone.

A nasal snare is now inserted, the end of the shaft being passed into the incision, and the wire loop being round the lower border of the turbinal. In this position it is tightened, and the soft tissue is thus snared off.

(b) *Posterior Turbinotomy.*—(Removal of Posterior Ends of Inferior Turbinal.)

Posterior turbinotomy is performed when the posterior ends have undergone mulberry hypertrophy and are causing obstruction, or are leading to secondary changes in the Eustachian tube or middle ear. The presence of the hypertrophy is readily diagnosed on posterior rhinoscopy, when that method is practicable. Otherwise it is visible in the nasal endoscope. (See Plate III, Fig. 4.)

Removal may be effected by the snare or by posterior turbinotomy forceps, and either under local or nitrous oxide anæsthesia—the latter is preferable, as it permits of the finger being passed into the naso-pharynx to guide the snare-loop into place.

Anæsthesia.—*Local*, by tampons soaked in sol. cocaine (10 per cent.) and sol. adrenalin (1-1000), or *general*, nitrous oxide or ethyl chloride being sufficient.

The snare-loop is bent towards the side to be operated on, and passed along the floor of the nose to the pharynx. It is then turned so that the bent loop may engage the posterior end, and when it is felt to do so, the loop is slowly tightened and closed. In manœuvring the loop round the turbinal, the left forefinger in the naso-pharynx is very useful, but when the hypertrophy is large the loop effects a hold without any such assistance.

When the loop has been drawn as tight as possible, the snare should be pushed *back* into the naso-pharynx so as to sever the posterior end *only*.

If it is pulled forward, and the mucosa is tough, the whole of the turbinal covering may be stripped from behind forward. (See Fig. 122.)

If the forceps are used, the posterior end is merely cut through and dropped or twisted off.

Other hypertrophies of the inferior turbinal, of the pseudo-papillomatous and mamilliform nature may be snared in like manner.

After-treatment.—The slow tightening of the snare prevents serious hæmorrhage, but the patient should be kept in bed for a day or two after the operation. The nose may be syringed through with normal saline the

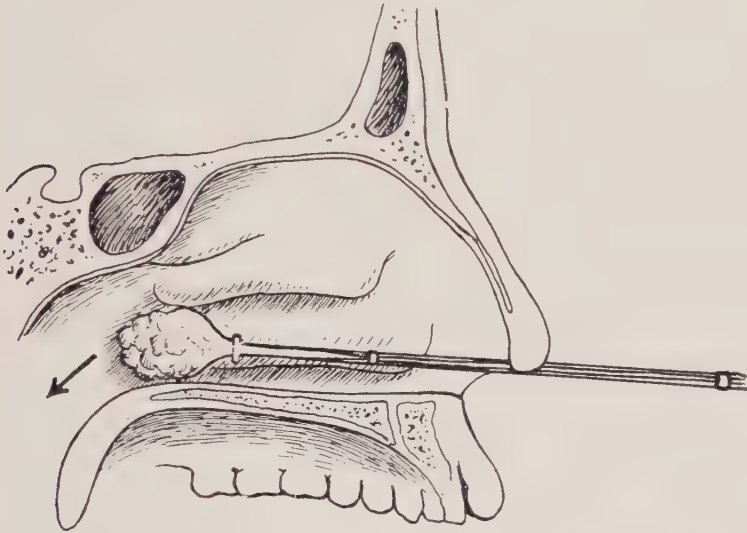


FIG. 122.—Removal of Enlarged Posterior End of the Inferior Turbinal by Snaring. After the snare has been fully tightened the bulbous end of the turbinal is detached by a jerk backwards in the direction of the arrow.

day after the operation, to empty it of blood-clot ; but unless pus is present regular douching or syringing is not required.

MUCOUS POLYPUS OF THE NOSE

(See also "Ethmoidal Suppuration," p. 350.)

Pathology.—The word "polypus" has no precise pathological significance, but it is still retained as a term of convenience because it connotes certain well-recognized and common pedunculated or fimbriated outgrowths of mucous membrane, such as the "mucous polypus" of the nose, the rectum, the uterus and so on, which modern pathology has taught us are not new growths. In the past, however, the name was also applied to pedunculated malignant growths in the nose and elsewhere, and indeed we still occasionally speak of "malignant polypus," but as a matter of fact,

there is a general tendency nowadays to refrain from calling malignant growths, or other tumour formations, "polypus," and to restrict the use of the term to the "mucous polypus," from whatever cause arising.

And this tendency is to be encouraged, since there is no doubt that a simple or nasal mucous polypus is not a *myxoma*, which is a tumour composed of mucous tissue like Wharton's jelly. The mucous polypus is not, indeed, a new growth at all. It is merely a result of œdema, and the fact that the cedematous tissue adopts the shape of a polypus, simulating in outward appearance a true neoplasm, is a pure accident dependent upon certain local peculiarities.

In other words, the "*mucous*," or to give it its correct pathological title, the "*serœdematous polypus*," of the nose is merely an expression of inflammation, and is no more a tumour than is the rounded dorsum of the cedematous hand in teno-synovitis of the flexor tendons in the palm.

That being so, we discuss nasal polypi at this point instead of in the section dealing with tumours of the nose, but we must devote a special section to their consideration because their presence, bringing with it certain adverse mechanical factors, demands special therapeutic measures in addition to those directed to the disease or diseases of which they are the outcome.

The mucous polyp of the nose is composed of loose cedematous connective tissue containing mucigen, with a small number of mucous glands, and is covered with the columnar ciliated epithelium of the nose, save when the polyp is exposed to air sufficiently to dry it, in which case the epithelium loses its cilia and becomes stratified. The same circumstance—exposure to an air-current—if prolonged, may also lead to a fibrosis, a solidification, so to speak, of the semi-fluid interior of the polypus, which then comes to possess a fibro-œdematous structure. But it is not a fibroma.

Any inflammatory condition, if sufficiently prolonged, will lead to polypus formation in certain definite regions of the nose. They sprout from the surfaces of the middle turbinal, and of the hiatus semilunaris; and, less frequently, from the roof of the nose. They arise also from the mucous lining of the accessory sinuses, those from the ethmoidal cells easily finding access to the nasal chamber, where the free space enables them to attain considerable dimensions. When they grow from or near the orifice of the antrum or sphenoidal sinus also they may appear in the nose. But those which spring up from the lining inside those cavities, and from the frontal sinus, may grow to fill the whole of the interior of their cavity, but they do not reach the nose, and their growth does not seem—unlike true tumour-growth within these sinuses—to cause any erosion of the sinus walls, although, as O. Hirsch has pointed out ('Journ. of Laryngol.,' vol. xlii, p. 46), they occasionally lead to atrophy of the maxillary sinus wall.

In the ethmoidal region, also, free polypus growth induces serious pressure effects. If the middle turbinal does not itself participate in the polypus formation, it is not unusual to find it flattened out as thin as a leaf against the bony septum. And when it does participate, the polypus

growth comes in time to effect a complete disruption and disintegration of the structure of the bone, and the same remark applies to the whole of the ethmoidal labyrinth, the bone of which, being thin and papyraceous, is evidently unable to resist the swelling of its contained mucous cavities, as the stouter sphenoidal and frontal bones do.

In this condition, also, it is not uncommon to find that the bridge of the nose has become broadened as a result of the expanding pressure of the increasingly bulky polypoid masses inside the nose.

It is interesting and remarkable to find that although in such cases of luxuriant polypus formation the nasal septum participates in the œdema, yet its mucosa very rarely becomes polypoid. All that is produced is a general soft swelling, pitting on pressure and limited to the ethmoidal septum. The cartilaginous and vomerine portions either escape entirely, or their swelling is relatively insignificant.

Arising in this way, as a consequence of inflammatory, or to speak more accurately, *hyperæmic* conditions, nasal polypi are found in—

1. Chronic hypertrophic rhinitis—being analogous to the pseudo-papilloma and solid hypertrophies of the inferior turbinal.
2. Suppurative disease of the ethmoidal cells and other accessory sinuses.

They also form in the disease known as—

3. Paroxysmal rhinorrhœa, obviously from the general nasal œdema present in that condition.
4. Further, they appear also not infrequently when the ethmoidal region is the seat of malignant disease, as a consequence of the associated inflammatory reaction.

Polypi vary in number, in size, in rate of growth and in rapidity of formation, and, when removed, of recurrence, those which are associated with purulent sinusitis being the most troublesome.

Polypi rarely form in childhood, the usual age for their occurrence being from 20 to 40 years, but they are not infrequent in later life, and may be found in the aged. Men are more liable to them than women.

The *symptoms* are those of varying degrees of nasal obstruction, generally of gradual onset, though to some patients the obstruction may seem to have appeared suddenly. Occasionally the patient has the sense of a loose body in the nose. In marked obstruction the voice is toneless and the sense of smell is lost. The discharge from the nose is thin and watery in catarrhal cases, or thick and purulent when the polypi are secondary to sinus suppuration. The pressure of a large number of polypi, by blocking the orifices of sinuses previously healthy, may induce sinus disease, while epiphora also may arise from obstruction of the nasal duct. As we have already seen, in long-standing cases the distension of the middle meatus may broaden the nose externally. Neuroses, such as paroxysmal sneezing, asthma, cough, etc., are frequent concomitants of nasal polypi, and obstructive deafness is common in this, as in all forms of nasal obstruction associated with inflammatory change.

On *examination*, the cause of the symptoms is, as a rule, easily found in the smooth, glistening, greyish-blue, semi-translucent, movable tumours. Occasionally only one solitary polypus is present, in which case it may attain to a giant size. But, generally speaking, they are multiple and also bilateral. In early cases, we may find only one or two small polypoid swellings on the under-surface of the middle turbinal, or between that structure and the lateral wall of the nose, but later the whole of the turbinal may be transformed into a mass of polypi filling up the whole of the middle meatus, and, indeed, extending to occupy the entire free space of the nasal cavity.

Such polypi are easily seen, and indeed may actually be found to be protruding from the anterior nares. But when single and in remote localities, they may escape detection, as when they are growing from the posterior end of the middle turbinal, or in the case of small polypi attached to the lip of the accessory opening of the maxillary antrum, or protruding from the sphenoidal sinus. When these last become larger, however, they appear in the naso-pharynx (Choanal Polypi, see below). Such deep-seated polypi may be rendered visible by reducing the turbinals with cocaine; or the nasal endoscope or posterior rhinoscopy may reveal their presence. Sometimes the patient, by blowing the nose hard, can bring a deep-seated polyp into view.

Choanal Polypus (Fig. 126).—A polypus appearing in the posterior choana usually proceeds from near the lip of the accessory opening of the antrum (antro-nasal polypus), less often from the sphenoidal sinus, or from the posterior ethmoidal region. Polypi from these sites grow back towards the posterior choana, and, if neglected, will pass into the naso-pharynx and appear from behind the soft palate, where they may be seen on looking at the throat. In this situation, the antro-nasal polyp is liable to slough, as its stalk is sharply bent against the edge of the antral orifice.

Diagnosis.—The beginner always mistakes the inferior turbinal for a mucous polyp, and yet the only resemblance between them is that both are conspicuous bodies in the nose. The turbinal is red; the polyp is grey-blue. The turbinal is fixed; the polyp is movable. The turbinal is sensitive; the polyp is devoid of all sensation.

In a case with nasal polypi, it is often necessary to remove the growths before a diagnosis of their cause can be made, but, on the other hand, a true diagnosis is just as often possible at first sight. If pus is seen freely exuding from among the growths, if they are multiple and if they are recurrent the cause is sinus suppuration, and our next step will be to determine which sinus or sinuses are affected. (See p. 331.)

If no pus can be seen, if the polypi are few in number and of slow growth or tardy recurrence, the cause is probably catarrhal rhinitis, but we must be careful to exclude the sinuses before forming a definite opinion on this point.

If no pus can be seen, and if the history of the case is that of violent and

prolonged sneezing with profuse watery discharge from the nose, the cause is probably vaso-motor paroxysmal rhinorrhœa. (See p. 316.)

If there is a history of profuse epistaxis, with pain and fœtid discharge in one side of the nose, the suspicion of cancer will arise. (See p. 305.)

Prognosis.—Naturally the prognosis is that of the cause of the polypi. As regards the growths themselves, the prognosis is best in the case of solitary polypi without sinus suppuration and of slow growth, and worst in the case of polypi from sinus suppuration. Under modern methods of treatment, however, we can promise non-recurrence and cure, save, of course, in the case of polypi due to malignant disease.

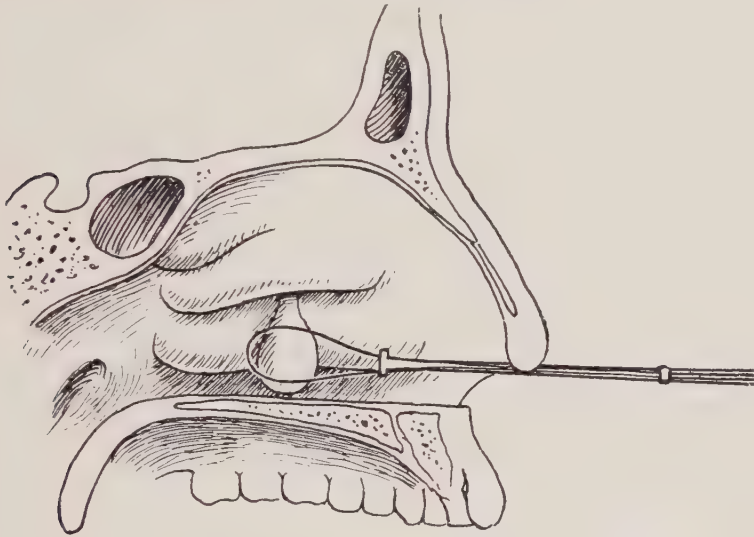


FIG. 123.—Removal of a solitary polypus by snaring. Introduction of the snare.

The *Treatment* of nasal polypus resolves itself into two parts ; first, the removal of the polypi as radically as possible ; and secondly, the treatment of their cause.

The radical removal of the polypoid growths generally involves the removal of the site from which they are growing, and this works out in practice as the removal of the diseased and broken-up ethmoidal cells and bone generally by the operation of *curetting*. Before proceeding to curette, however, it is advisable to clear away as many of the bulkier polypi as possible with snare or forceps, or both, for two reasons ; first, to restore nasal patency ; and secondly, to clear the ground for the operation of curettage.

Moreover, we must not omit to note that in the case of solitary and slow-growing polypi, due to non-purulent catarrh, their simple removal by the snare, if complete, and especially if the bone at the base is also detached, will, in many cases, be sufficient for cure.

Snaring a Polypus. Local anæsthesia by tampons is employed, and the procedure is almost painless. Heath's modification of Wilde's snare is recommended, with the writer's simple wire-holes. (Fig. 125.)

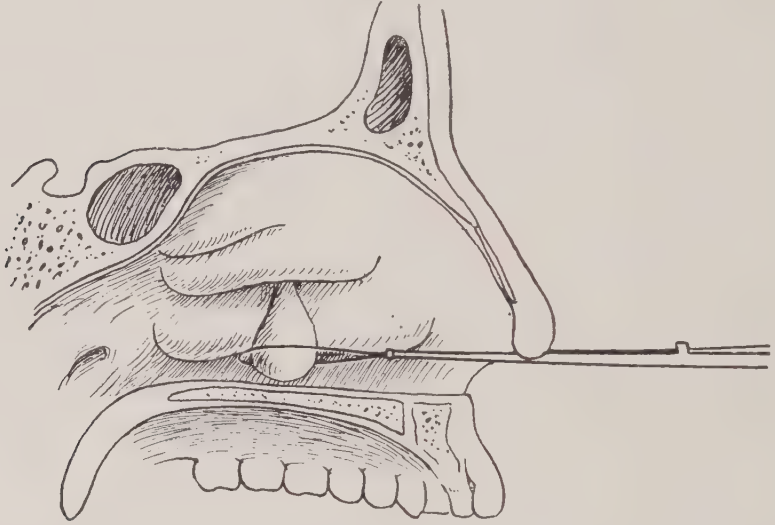


FIG. 124.—Removal of Solitary Polypus by Snaring. The loop of the snare engaging the polypus.

The cocaine-adrenalin tampons having been removed, the snare-loop is passed along the inferior meatus of the nose, the loop being borne sideways so as to avoid the inferior turbinal. (Fig. 123.) When it has come to a position immediately under the polyp, it is raised upward under inspection,

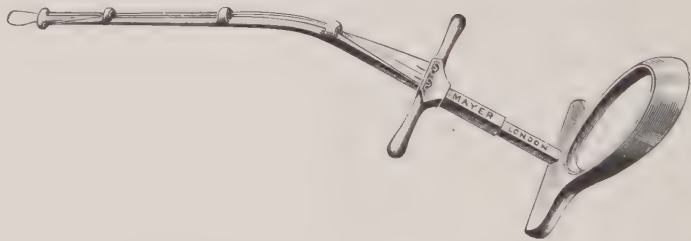


FIG. 125.—Nasal Polypus Snare, with author's simple wire-holes. (Wire with No. 7 English gauge.)

in such a way that the polyp is received in the wire loop. (Fig. 124.) The loop is now carried up as far as the attachment of the growth in the middle meatus, and is closed tight, so as to snare the polyp quite close to its attachment.

The snare is not intended to cut through the polyp, so that whenever

the growth is felt to be closely enough strangled, it is *pulled* off its attachment to the turbinal with a quick jerk of the hand. This manœuvre may be repeated with fresh snares as often as is required to remove all visible polypi, but it is most suited to cases with single or small polypi. Where they are numerous and large, it saves time and is no more painful to remove them wholesale by means of the author's nasal forceps. (Fig. 127.)

In nervous patients, with multiple polypi on both sides, two or more *séances* may be necessary to complete the removal. The rule is to effect a

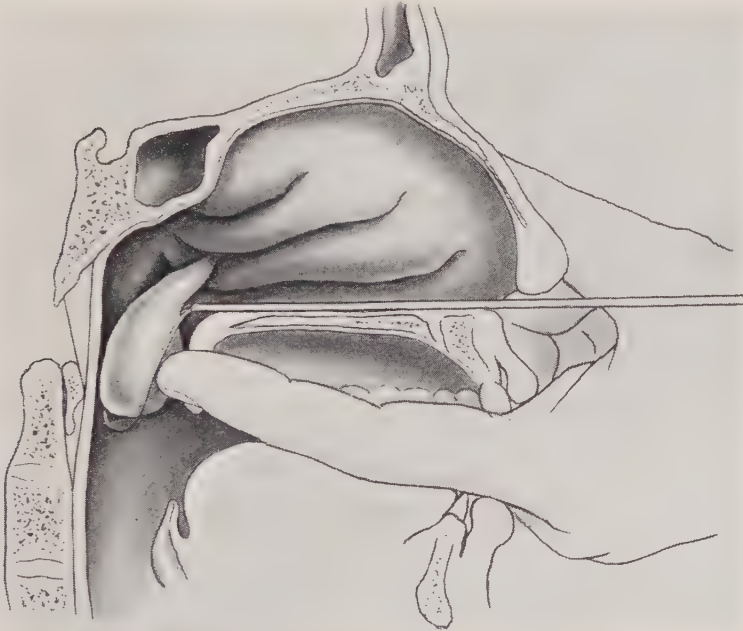


FIG. 126.—Snaring a Choanal (or Antro-nasal) Polypus. (After Laurens.)

clearance on one side at least, so as to restore nasal breathing at once as fully as possible.

Occasionally the patient may prefer a general anæsthetic. (See below.)

The bleeding when polypi are being removed is very free indeed, and preparations must be made for it; but it stops spontaneously, so that packing the nose, which is both unpleasant and liable to induce sepsis, is seldom or never required.

After-Treatment.—If only a single polypus has been removed the patient may be allowed to return at once to ordinary life and occupation; but if the operation has been extensive, or has caused much bleeding, the patient should be kept in bed for several days.

If further removals are necessary; if a curetting is to take place; or

a sinus operated on ; or any other nasal operation performed, it is advisable to delay any such fresh interference until at least a fortnight has elapsed from the first operation. Otherwise, we must operate through a septic wound, and the inflammatory reaction may be severe.

In aged patients, the bone of the roof of the nose being very brittle, the removal of polypi should be effected with the most cautious gentleness (Wingrave).

Removal of a Choanal Polypus.—(1) The snare having been inserted into the nose, its loop is guided round the polyp by the finger passed into the naso-pharynx through the mouth. (Fig. 126.)

(2) Or the author's nasal forceps (Fig. 127) may be used, being passed into the nose and turned so as to grasp the pedicle of the polypus close to or within its orifice of origin.

(3) Large choanal polypi are most easily removed by means of Jurasz's

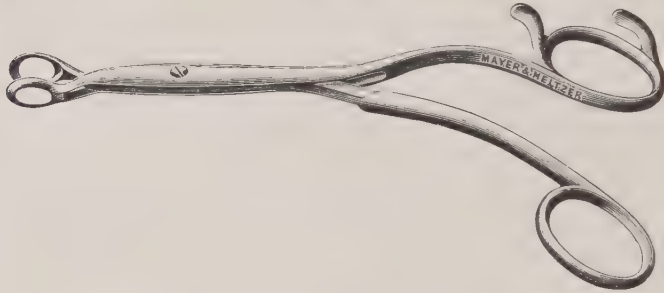


FIG. 127.—Author's Nasal Forceps.

adenoid forceps (Fig. 171) inserted into the naso-pharynx through the mouth.

For these manipulations a general anæsthetic (nitrous oxide or ethyl chloride) is advisable.

Should an antro-nasal polypus recur after it has once been removed the maxillary antrum should be opened as in the Caldwell-Luc operation (see p. 346), and its mucous lining, if œdematous, removed. But as a matter of fact recurrence after complete removal is rare, as in these cases the antrum is not the seat of suppuration.

CURETTAGE OF THE ETHMOID

for polypoid disease (Lambert Lack).

In multiple ethmoidal suppuration with polypus formation simple avulsion of the polypoid growths, whether by snare or forceps, is insufficient to cure the case. The diseased areas must be entirely removed, and for this purpose curetting is the safest, most rapid and most efficient method.

Curettage should, however, be reserved for suitable cases. It is unnecessary when polypi are few and slow-growing, and when there is no

ethmoidal cell suppuration. The most suitable cases are those where long-standing and extensive disease has already broken up and destroyed the normal ethmoidal labyrinth.

Anæsthesia.—A general anæsthetic (nitrous oxide and ether, or chloroform) is advised. But the operation, even when the disease is extensive, can be done under local anæsthesia (cocaine-adrenalin tampons) if the patient does not object to two or more *séances*.

The patient may be seated upright in a chair, or may lie on the back with head and shoulders raised, and head turned on one side.

Very free hæmorrhage must be anticipated, for which reason the sitting position brings many advantages. If the patient is reclining, blood is apt to find its way into the air-passages unless a captive sponge is placed in the naso-pharynx.

During nasal operations in the recumbent position attended with much bleeding, it is advisable to turn the patient's head well on the one side in order that the blood may run freely from the nose, and in order that blood coughed up from the throat may find its way into the dependent cheek and not fall back again into the pharynx. If the head is lowered the bleeding will be increased, and with it the surgeon's embarrassments.

It is often possible, however, even when the patient is recumbent, and without a sponge in the naso-pharynx, to insert a dam of gauze-strips into the back of the nose sufficient to keep the pharynx from being flooded. For the rest, one trusts to rapid throat-sponging, for which at least a dozen George throat-sponges should be at hand, and should be the sole charge of one nurse.

If adrenalin is used at the operation, severe reactionary hæmorrhage is likely to set in after the operation, and may necessitate packing, whereas the ordinary bleeding at the operation comes or is brought to a permanent standstill before the patient leaves the operating table.

The *Preparation* of face and nose is the same as for submucous resection. (See p. 253.)

Operation.—After any additional obstructing polypi have been removed with forceps, a ring curette is passed into the nose and borne upwards to the posterior ethmoidal region. Held lightly in the hand, and with the sharp edge turned outwards, the instrument sweeps through the ethmoidal region in a direction downward and forward, removing in its course polypi, broken-up pieces of ethmoidal bone and *débris*. The free hæmorrhage prevents any inspection, so that curetting must be done under the guidance of the surgeon's little finger, passed (gloved) into the nose from time to time. It is possible to palpate with the finger the whole ethmoidal area from the sphenoidal to the anterior ethmoidal region, and thus to form a mental picture for the guidance of the curette.

In curetting only light strokes are to be used, and any bony resistance felt is not to be overcome. If the curette is kept on the outer wall of the nose, the only damage likely to be done is a breaching of the bony inner

wall of the orbit, with consequent orbital ecchymosis. But even this is avoidable with ordinary care.

Both sides may easily be cleared at the one sitting.

Difficulties and Dangers. The reader is referred to p. 348 for the anatomy of the ethmoid. The limits of operating there laid down should not be transgressed.

After-treatment.—Hæmorrhage ceases, as a rule, before the patient emerges from the anæsthetic. If it continues, the ethmoidal region may be tamponned with dry ribbon gauze or gauze strips, the inferior meatus being left clear of packing. The gauze is removed in not more than twelve hours, and not replaced unless severe hæmorrhage is recurring.

The nose may be syringed daily with normal saline in suppurating cases. Otherwise, there is no need to repeat the lavage after the first and second day.

The patient is usually able to get up within a week of the operation.

Results.—After complete curetting, freedom from polypus recurrence is the rule. Occasionally, a curetting has to be repeated once or even twice. But the ultimate result is always cure of the polypus-formation. When the parts have cicatrized, the roof of the nasal cavity assumes a smooth form where the little orifices that lead into the remaining ethmoidal cells are clearly visible.

Removal by External Operation.—Some surgeons approach the polypus-bearing ethmoidal region through an external incision, such as that known as lateral rhinotomy (p. 309), whereby a satisfactory view of the field of operation is provided, and the removal of the lateral mass of the ethmoid or the opening of its cells for drainage can be undertaken with all the advantages of visual guidance. The resulting scar is inconspicuous and the operation has much in its favour, especially in polypoid disease arising from sinus suppuration.

In the same way, when the frontal sinus is being operated on by the external route, the incision may be planned so as to permit of access to the ethmoidal region as well as to the frontal sinus (p. 371).

Or again, as we shall see later, when the radical operation is being performed on the maxillary antrum, the ethmoidal region may be curetted across that cavity (p. 347).

In a word, curetting through the nose should be reserved for those cases in which sinus suppuration is absent, or in which it is of such a nature as not to require external operation.

Meningitis after Removal of Polypi.—It is fitting that we should allude here to a disastrous but fortunately extremely rare accident that may follow the removal of polypi, even by simple snaring, namely, septic meningitis. We have already mentioned the risk of detaching a portion of the cribriform plate in aged persons. But meningitis may occur without any such obvious cause. Sometimes a carious area in the roof of the nose, the presence

of which gives rise to no symptoms and is therefore unsuspected, may be the avenue through which the infection reaches the meninges. But in many instances no route is disclosed at the post-mortem. As the accident cannot be foreseen, it cannot be prevented. Fortunately it is so rare that but few rhinologists have ever seen a case, and for all practical purposes it may be ignored.

RHINITIS SICCA AND ATROPHIC RHINITIS

In the following section we are dealing with several nasal disorders which are generally grouped together, not because they are pathologically akin, but because they manifest one common clinical characteristic, and that is a tendency to dryness of the nasal mucosa—what we may venture to term *Rhinoxerasia* (ξηρασία, dryness).

We include in this group (1) the so-called Rhinitis Sicca, and (2) Atrophic Rhinitis, of the latter of which the following three varieties are distinguished :

- (a) *Simple (non-fœtid) atrophic rhinitis* ;
- (b) *Syphilitic atrophic rhinitis* ; and
- (c) *Ozænatous atrophic rhinitis, or ozæna*.

Of these, the last two are certainly specific diseases, and it is equally certain that rhinitis sicca and simple atrophic rhinitis are not diseases at all. They merely represent a physical condition—rhinoxerasia—and are, in other words, the result, it may be the terminal stage, of certain other diseases of the nose.

RHINITIS SICCA

This term is, therefore, a misnomer, since, as we have just said, the condition to which it applies is a physical effect of other diseases, and not a disease-entity in itself.

The one characteristic of the condition is a relative dryness of the nasal mucosa, which is manifested in the mucous secretion being scanty and thick so that it readily dries into viscous threads and adherent scales, particularly in those areas which are normally exposed to the ingoing air-currents, such as the antero-inferior portion of the septum (Little's area) ; the antero-inferior surface of the middle turbinal ; and—to leave the nose—the posterior wall of the naso-pharynx and pharynx. The condition is one which may be due to an enfeeblement of the ciliary action of the cells of the mucous surfaces in consequence of which the mucus is permitted to cling, to lodge, and finally to dry into a scale or fine crust—a process which, by further impeding the ciliary movement, furnishes a typical instance of the vicious circle.

As predisposing factors, we may mention an unduly wide nasal passage from whatever cause arising, and, especially, the extensive removal of turbinal tissue, seeing that that may both render the nasal passages

abnormally roomy, and provide, likewise, areas of non-ciliated cicatricial tissue upon which the mucus readily dries.

Rhinitis sicca is distinguished from simple (non-foetid) atrophic rhinitis by its crusts being scaly and fine, and by their being composed solely of mucus.

SIMPLE (NON-FŒTID) ATROPHIC RHINITIS

is characterized by the formation of crusts, not in one or two areas only, but generally distributed all over the interior of the nose, and these crusts are not only composed of dried mucus, but they also contain pus-cells and epithelial *débris*, while atrophy of the mucosa, and particularly of the inferior turbinal bone, and sometimes of the septal cartilage, is pronounced.

Respecting this feature of atrophy, it is probably the case that it is the simple effect of the pressure of the adherent crusts. This pressure operates by producing anæmia and atrophy of the structures under the crust, its effects being most strikingly manifested in the fenestration beneath intact mucosa of the septal cartilage in Little's area. The atrophy, in a word, is mechanical, and the fact that it is more obvious in "atrophic rhinitis" than in "rhinitis sicca," is due to the crust formation in the former being more widespread and constant.

Simple atrophic rhinitis is distinguished from ozænatous rhinitis by its milder course, by the absence of fœtor from its crusts, and, according to Wyatt Wingrave, by the absence of acid-fast bacilli. It is seen in its most advanced and typical form in the later stages of ethmoidal or sphenoidal sinus suppuration, when extensive curetting has been necessary, and when there is still some lingering suppuration.

Treatment (of Rhinitis Sicca and Simple Atrophic Rhinitis).—Obviously it is important to avoid producing the conditions which lead to rhinoxerasia, and in operating on the nose, therefore, the rule is to remove as little as possible of the physiologically active structures; and of all such structures the most important is the inferior turbinal body. It is also important to avoid the infliction of open wounds and the production of raw surfaces which, on healing, become extensive areas of scar-tissue covered with non-ciliated epithelium.

We may note in passing that, as D. Shaw has pointed out to me, post-operative rhinitis sicca or atrophic rhinitis is less common in the humid climate of the British Isles than it is in more arid countries. Operators abroad, therefore, as in the United States, Canada, India or Africa, soon learn to be more cautious in removing intra-nasal tissues than their English colleagues need to be.

For the treatment of the condition once it is started, if it is mild as in *Rhinitis Sicca*, the irritation and stuffiness it induces may be relieved by the daily use of simple liquid paraffin sprayed into the nose by means of an atomizer.

For the more advanced types (*Atrophic Rhinitis*), the nose should be

syringed daily with the alkaline solution detailed on p. 275, and in sinus cases provision should be made for the free drainage of any sinuses that may still be suppurating. For such lingering sinus suppuration, vaccines may be tried. (See p. 382.)

For *Syphilitic Atrophic Rhinitis*, see p. 300.

ATROPHIC RHINITIS (OZÆNA; OZÆNATOUS RHINITIS)

Ozænatous rhinitis is a disease the causation of which is unknown. It is clinically characterized by the transformation of the ciliated columnar epithelium of the nose into pavement epithelium; by the presence of crusts and stagnant secretions exhaling a peculiar and repulsive odour; by atrophy of the mucosa and skeleton of the respiratory part of the nose, and frequently, by an extension of the disease, also along the air-passages, to the naso-pharynx, pharynx, larynx and even trachea.

It shows no tendency, however, to leave the route of the respiratory current and to attack the mouth, the laryngo-pharynx or the œsophagus, and even the middle turbinal and the upper regions of the nose are seldom invaded, the middle turbinal being indeed usually enlarged and œdematous, in striking contrast with the inferior turbinal. Moisture is thus obviously inimical to its spread.

The crusts and secretion in a developed case consist of pus-cells, epithelial cells, sticky or dried mucus and a host of bacteria of different kinds, to the influence of which is due the peculiar foetor characteristic of the disease.

The theories of its causation are many and various. A few of them may be mentioned.

(1) That it is due to a specific organism, the *cocco-bacillus foetidus ozænæ* of Perez. This view has been accepted by a large number of modern authorities, although Tanturri, Caldera and others have failed to confirm Perez's results. ('Laryngoscope,' vol. xxx, p. 31.)

(2) That it is a para-tuberculous affection—a conclusion favoured by the facts that ozænatous patients sometimes develop phthisis pulmonalis and frequently give a family history of tuberculous diseases. This view was adopted by the writer in association with Wyatt Wingrave and J. Mackeith after an extended clinical and bacteriological investigation. ('Journ. of Laryng.,' vol. xxxi, p. 177, etc.) It is also held by Cozzolino, Gradenigo and other Italian workers.

(3) That it is secondary to nasal sinus suppuration. (L. Grünwald, 'Nasal Suppuration,' Eng. trans., London, 1900.) The chief objection to this theory is that it fails to explain those cases of sinusitis which do not develop ozæna.

(4) That it is the end-result of purulent rhinitis in childhood. (Lambert Lack.)

(5) That it is due to the Klebs-Löffler bacillus.

(6) That it is caused by a perverted mucous secretion. (W. Stuart-Low.)

(7) That it is a trophic neurosis.

(8) That it is due to the nose being anatomically too wide.

(9) That it is an atrophy of the mucosa from endocrine troubles or general infections.

Perez regards ozæna as both infectious and contagious. (See A. Brown-Kelly, 'Journ. of Laryng.,' vol. xxix, p. 250.)

Symptoms.—Ozæna attacks females by preference, and it usually begins in childhood between the ages of seven and twelve, but so slow is its progress that it seldom attracts any attention until after puberty, when the crust-formation and fœtor begin to force their presence upon the patient and her friends. The disease is at its height from the age of twenty to thirty years, and then it usually undergoes a slow involution, the crust-formation becoming scantier, the nose cleaner of discharge and the atrophy less noticeable.

A number of cases develop tuberculosis in the lungs or elsewhere, but the nasal disease, nevertheless, seems as a rule to end in recovery.

In the earlier stages, the mucous membrane of the nose is dry and studded with minute, discrete, circular, greyish spots of thin, dried secretion, which, even at this period, disseminate faint whiffs of the characteristic odour. Later, when it is more fully developed, the patient complains of nasal discharge and crust-formation, but, fortunately for her, she is herself unaware of the odour she exhales, as her anosmia is usually absolute. Herein lies a minor point of distinction from sinus suppuration, where the subjective fœtor is often a source of great annoyance to the patient.

On inspection at this period, the most striking feature is the wide, roomy nostril, the walls of which are lined with sticky, yellowish crusts adherent to the underlying mucous membrane. These crusts may be removed in great casts or flakes, laying bare an excoriated and roughened surface, over which little bleeding points and minute specks of pus are to be seen. The sticky secretion may also be festooned across the nasal cavity in strings.

When the nasal passages have been cleared of crusts and secretion, the roominess of the nostril is seen to be caused by a marked atrophy of the mucous surfaces and especially of the inferior turbinal body, which may seem to have so completely disappeared that we can see straight back into the naso-pharynx.

A flat nose with gaping nostrils is typically associated with ozæna, and some observers look upon this type of nose as a predisposing cause of the disease, but it is probably only an effect, as is also the dimpling of the bridge to which we have already alluded. (See p. 231.)

When the septum is strongly deviated the disease falls with more severity upon the wide than upon the stenosed side, but the latter is not spared, however.

Crust deposit and desiccation of the mucous surface may also be seen in the posterior pharyngeal wall, in the cavity of the larynx, and even in the trachea. (Pp. 119 and 185.)

Generally, the patient is anæmic and unhealthy-looking.

Nasal Obstruction.—In addition to the usual symptoms of discharge

and crust-formation a complaint of obstruction to nasal respiration is not infrequently made by patients with advanced atrophic rhinitis, although, as a matter of fact, the nasal passages are found to be much more roomy than in the normal nose. This curious symptom, which is, of course, an erroneous observation on the patient's part, is probably due to a combination of factors. First of all, the tactile sensibility of the nasal mucosa being diminished, the patient no longer experiences the normal sensation produced by the air-currents passing in and out through the nose. Secondly, the unduly wide passages permit of an inspiration and expiration so free from muscular effort that the respiratory kinæsthetic sensation is lowered, so that the act of respiration makes less impression upon the consciousness than when the nose is normal or the seat of real obstruction. Thirdly, when the patient attempts to blow the nose, the air rushes through the widely-dilated channels so suddenly and impetuously that the soft palate flaps upward into the naso-pharynx like a tongue-valve, and so prevents or seriously hinders the expiratory blast from sweeping forcibly through the nasal passages.

Paradoxical as it may seem, therefore, a certain amount of impediment to the airway in the nose is necessary, both for comfortable nasal breathing and for clearing the nose of its secretions by blowing; and the absence of this normal impediment in advanced atrophy gives rise to the belief in the patient's mind that she is unable to breathe through the nose.

Diagnosis.—In *Syphilis* affecting the nose there is often crust-formation and fœtor, but the odour is different from that of atrophic rhinitis, and careful examination will reveal in syphilis a gummatous ulcer affecting the osseous parts of the nose, where bare bone may be felt on probing. In atrophic rhinitis (*ozæna*) there is no necrosis or caries of bone, although an undoubted osseous atrophy exists. From the atrophic rhinitis which follows syphilis of the nose the distinction may be made as outlined on p. 300.

From *rhinitis sicca*, even in its most aggravated forms, *ozænatous* rhinitis is differentiated by the odour, by the tendency to dense crust-formation, by the shorter history, and, according to Wyatt Wingrave, by the presence in the crusts of acid-fast bacillary forms in large numbers.

Complications.—Apart from atrophic pharyngitis, laryngitis and tracheitis, *ozæna* is not uncommonly associated with an intractable form of conjunctivitis. And we have already mentioned the liability to tuberculosis—a fact which renders periodic examination of the lungs and sputum necessary.

The nasal disease occasionally sets up accessory sinus suppuration, generally in the antrum and ethmoidal cells. But the contention of Grünwald that *ozæna* is always caused by accessory sinus suppuration is no longer credited.

The *treatment* of *ozæna* is symptomatic, and consists in the adoption of measures to remove discharge and crusts, and to prevent and hinder their re-accumulation, but it is possible that even such simple cleansing

measures have also a curative action, in that they wash away from the surface of the mucous membrane the material which produces the disease.

The author advises the use of glycerine tampons—pledgets of cotton-wool soaked in glycerine and inserted by the patient into each side of the nose for twenty minutes daily. The tampon should be large enough to fill the nose and to extend along its whole antero-posterior length. The glycerine causes a free exudation of serum and watery mucus, which continues for some time after the tampon is withdrawn, and this loosens the crusts and permits of their being blown or syringed out. As a matter of fact, when the treatment is in daily progress, crusts seldom form. Should they do so they will appear in regions which escape the daily action of the glycerine, and it will be generally found that the glycerine tampons are being improperly inserted, or are of insufficient size. Under this treatment the submucous tissue regains bulk, and the atrophied turbinals gradually assume something of their normal shape and fullness.

T. H. C. Benians and C. H. Hayton ('Journ. of Laryng.,' vol. xxxiv, p. 325) speak highly of the use of liquid glucose 25 per cent. in glycerine, applied thoroughly and methodically on a cotton-wool applicator four or five times a day at first, and later less frequently. The surgeon himself should make the first applications, and instruct the patient how to carry them out. A spray or irrigation of 10 per cent. of the above mixture in water may also be necessary to reach the naso-pharynx.

In addition, or as an alternative, if glycerine is badly tolerated, the nose should be regularly syringed with—

R	P. Potass. Chlor.	}		āā	ʒiv
	P. Sod. Bibor.				
	P. Potass. Bicarb.				
	P. Sacch. Alb.				
				ʒj	
				M.	

Sig. ʒij in half a pint of warm water.

Or Dobell's solution may be used. It is—

R	P. Sod. Bicarb.		gr. c
	P. Sod. Bibor.		gr. c
	Ac. Carbol.		ʒc
	Aq. ad.		Oij
			M.

Many other remedies are at the practitioner's disposal in this obstinate malady, but nearly all owe what good they impart to a combination of the physical stimulation of the mucosa and the washing away of crusts and impurities.

A *Vaccine Treatment* by the Perez bacillus has also been tried and is sometimes advocated.

Destructive operative measures inside the nose should be avoided. The swollen and œdematous middle turbinal is best left alone. If the antrum is full of pus, it should be opened intranasally, but extensive operation should be avoided. Adenoids and tonsils should *not* be removed, as the

natural tendency is for the disease to induce an involution and disappearance of all lymphoid tissue about the nose and throat.

Operative Treatment.—With the object of reducing the width of the too roomy nasal chamber, Lautenschläger, Halle and others practise displacement of the antro-nasal walls of both sides in the treatment of ozæna. The operation has been tried in this country by W. S. Syme. ('Proc. Roy. Soc. Med.,' Laryng. Sect., vol. xvii, p. 3.)

The maxillary antrum is opened through the canine fossa, and the opening is extended downward and forward so as to obliterate the anterior recess of the cavity. With a chisel the antro-nasal wall is divided horizontally along its lower part, and then by two vertical cuts at right angles to the horizontal division, anteriorly and posteriorly, the anterior being well forward. The nasal mucosa is not perforated. The wall thus mobilized is pressed forcibly inward so as to bring it into contact with the septum, and is fixed in that position by firm packing in the antrum. The packing is changed every other day for a fortnight, the nasal cavity being regularly douched. (A doubled-up drainage-tube may be used instead of gauze-packing.)

Results.—(W. S. Syme.) Of 16 cases reporting after operation, 14 had no more crusting or fœtor. In one the crusting and fœtor persisted. In 9 there was no discharge; in 7 there was some fluid. In 8 the sense of smell had returned.

We may therefore regard the operation as a promising development in the treatment of ozæna. It is obviously most suitable for the severer cases.

Rhinitis Caseosa is a rare condition characterized by the presence of a foul-smelling cheesy mass in the nose, always associated, it is said, with sinus disease. When in great bulk, nasal and facial deformity may be produced. Sometimes it contains a foreign body or a rhinolith as a nucleus. It causes a foul discharge and induces fœtor, both subjective and objective.

Diagnosis.—Caseous rhinitis may cause external deformity, such as undue prominence of the anterior bony wall of the antrum, and it may be associated with fleshy, vascular polypoid masses. It therefore may resemble a malignant growth, and the resemblance is frequently heightened by the patient losing weight.

The discovery of the characteristic caseous material is sufficient to remove the deception.

Treatment.—A small collection may be expelled by syringing, but if large, a general anæsthetic will be required in order that the mass may be broken up and scooped out by curettes and sharp spoons.

SYPHILIS OF THE NOSE

Congenital Syphilis.—The classical symptom of congenital syphilis in infancy is "snuffles"—a name which is applied to a chronic nasal catarrh with noisy breathing and an acrid discharge of muco-pus excoriating the

upper lip. On inspection, areas of congestion with mucous patches, usually on the septum, may be seen. Necrosis of bone or cartilage does not occur at this stage, but at or about puberty a necrosis of the cartilaginous or bony septum may occur, producing serious deformity if not promptly checked by suitable remedies.

Acquired Syphilis.—*The Primary Sore* sometimes forms on an ala or on the antero-inferior part of the septum from digital infection.

It appears as an indurated or nodular swelling which undergoes ulceration. The glands enlarged in consequence of chancre in this position are the submental, the submaxillary and the pre-auricular. They are hard and indolent.

Diagnosis.—From epithelioma it is distinguished by its short history, and by its tendency to spontaneous recovery in a few weeks. It may also be mistaken for a lupus deposit, although lupus is much more chronic, and is attended with less induration.

Treatment.—As soon as the diagnosis is made, constitutional treatment should at once be begun. (See p. 83.) Locally, a mild antiseptic ointment, such as ungt. ac. boric, is all that is required.

The nasal symptoms of **Secondary Syphilis** do not call for much comment. A slight nasal catarrh, with one or two mucous patches, may coincide with the secondary phenomena of the disease in the pharynx and on the skin.

It is very different with regard to **Tertiary Syphilis**, for the nose is at times the seat of "one of the most destructive forms of phagedæna." Gummata may form in the septum, in the turbinal bodies, or on the floor of the nose. At first they appear as firm, circumscribed, reddish swellings, but they soon become ulcerated, and extensive necrosis and destruction of the osseous tissue and soft parts may proceed with extraordinary rapidity. The nasal fossæ on examination will be found occupied with crusts and foul discharge, and careful probing will generally reveal necrosed bone. Wingrave has observed that the *Spirochaeta pallida* exists in large numbers in smears and scrapings from tertiary lesions of the nose. The patient disseminates a most sickening and penetrating fœtor. When the disease attacks the upper parts towards the roof of the nose, it may be impossible, at first, to estimate the extent of the necrosis, but probing and other interference in this region must be avoided, as the cranial cavity may be broken into, and septic meningitis set up. When this region is attacked, swelling, tenderness and pain over the bridge of the nose appear, and after the extrusion or removal of the sequestra, great deformity from collapse of the bridge is to be expected.

Gummatous deposit on the septum or turbinal bodies we seldom have an opportunity of seeing in its first stage, as no symptoms are produced until ulceration sets in with its discharge of blood and pus. Even nasal obstruction does not seem to attract any attention until after ulceration.

Such cases, when examined, may show very little wrong with the nose at first sight. All that is visible is complete stenosis of the affected side from swelling of the septum and the lateral wall, the mucous membrane of

which seems to be neither infiltrated nor ulcerated, and yet the application of cocaine has no effect upon the tumefaction. The stenosis remains. If a probe be now passed into the nose beyond the stenosed area, dead bone may be felt, and, in any case, bleeding from the wounding of granulations ensues.

On the floor of the nose a similar blockage may be produced, but as a rule the stenosis is less complete, so that the site of the lesion is visible, with granulations sprouting from the floor of the nose. This is the upper end of a perforating gumma of the bony palate, the lower end of which will be visible in the mouth.

We have already alluded to syphilis as if affects the alæ and vestibule. (See p. 270.)

Progress.—Syphilis of the nose is serious not only by reason of the deformity it may cause. It is also dangerous to life by reason of the facts, first, that the bone attacked often lies in contact with the meninges of the brain, and secondly, that when the bony necrosis is extensive (Fig. 128), the large open bone wound becomes septic and may lead to death from septicæmia. In such circumstances, also, even the most vigorous constitutional anti-syphilitic treatment may be impotent to bring about cure. The milder cases respond promptly, however, and when the dead bone has been exfoliated and removed, they soon get well, frequently leaving a legacy, however, in the shape of nasal deformity, or what is known as syphilitic atrophic rhinitis.

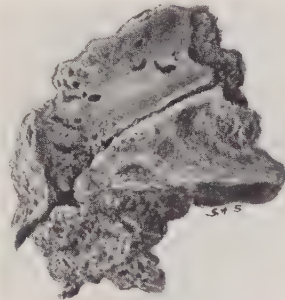


FIG. 128.—Large Syphilitic Sequestrum, comprising the palatal process of both superior maxillæ. Viewed from above. Natural size.

Syphilitic Deformities of the Nose.—

The whole of the external nose may be destroyed, leaving a mere hole. But as a rule, the deformity affects either the upper or the lower half of the feature only. The former, the bony bridge, is destroyed, or what amounts to the same deformity, it sinks in, as a result of syphilis of the nasal bones and ethmoidal septum. The point and lower half become depressed so as to give the nose the appearance of a broken beak, when gummatous ulceration attacking the alæ and columella undergoes healing.

I have also drawn attention to a curious absorption of the bone of the premaxilla with loss of the upper incisor teeth and sinking in of the upper lip as a consequence of necrosing syphilis of the bony septum.

Syphilitic deformity of the nose is produced during the period of healing, and it is therefore obviously due not only to the actual destruction of the framework of the organ, but also to the effect of cicatricial contraction. The premaxillary deformity, however, was noted as having occurred during the active stage of the nasal disease.

Syphilitic Atrophic Rhinitis is an extreme form of rhinitis sicca, and appears when extensive gummatous disease has destroyed large areas of the ciliated nasal epithelium, and has replaced them with areas of scar-tissue.

In addition to this obvious form, it occurs also in children with congenital syphilis in whom no history of gummatous disease can be obtained. In such cases it closely resembles ozænatous rhinitis. But the characteristic odour of ozæna is absent, as are the acid-fast bacilli which are found in the other. (Wyatt Wingrave.) These features, combined with the positive Wassermann reaction, suffice to establish the diagnosis of syphilis.

Treatment of Nasal Syphilis.—If seen before ulceration and bone necrosis takes place, prompt and energetic treatment by the salvarsan drugs, coupled with the iodides and mercury, will cut short the development of the disease. (See p. 83.)

If ulceration has taken place, and bare bone can be felt, prompt response to treatment may, nevertheless, be expected if the sequestrum is small, or if the bone is merely perforated, as in a septal or palatal gumma.

These are the cases in which potass. iodid. in doses of from 10 gr. upwards three times a day is most serviceable. It should, of course, always be associated with mercury.

When osseous necrosis is extensive, and especially when the presence of pyrexia shows the absorption of septic toxins, the response to treatment, even the most energetic, is sometimes slow in appearing, and may, indeed, never appear at all. The patient should then be kept in bed; the nose should be regularly syringed with warm antiseptic lotion; and as soon as the sequestra begin to feel loose, the patient should be anesthetized, and as much of the dead bone broken up and removed through the natural passages as can be got away. In doing so, it is necessary to refrain from active or forcible removal of sequestra near the roof of the nose, or in the sphenoidal region, as in the effort the dura, which is frequently exposed in these cases, may be torn through, with fatal consequences.

For the syphilitic atrophic rhinitis, the salvarsan group of drugs, along with potassium iodide, is very serviceable. But in all cases, and at all stages, mercurial treatment should also be employed.

Tuberculosis of the nose, apart from lupus, is rare. When it does occur, it is generally in association with pulmonary tuberculosis, but a primary infection of the septum is described at the spot where simple ulcer appears, and from the same cause, namely, infection by the finger-nail. It takes the form of a tuberculous nodule (tuberculoma), or of an ulcer presenting the same features as tuberculous ulcers elsewhere in the upper respiratory tract.

Treatment.—If definitely circumscribed, the tuberculous deposit should be excised as a whole, under cocaine-adrenalin-paste anæsthesia, the mucous membrane being elevated from off the smooth surface of the cartilage in a single sheet.

LUPUS OF THE NOSE

(See R. Weber (Edinburgh Statistics), 'Journ of Laryng.,' vol. xxxv, p. 7; and H. M. Wharry and O. Teichman, 'Lancet,' December 19th, 1925, p. 1277.)

For convenience we shall be making some allusions in this section to lupus of the mouth, pharynx and larynx, as well as to lupus of the nose.

Pathology.—Lupus is commoner in women than in men, and it usually makes its first appearance in the third decade of life.

In the nose the first deposit is seen at the anterior end of the inferior turbinal; at the muco-cutaneous junction in the vestibule, either in the little recess under the tip of the nose, or on the septum; on the floor of the nose; or on the septum about half an inch behind the columella.

From one or other of these positions it tends to spread in three directions:

(1) To the skin of the outside of the nose and of the face, with destruction of the alæ, thickening of the tissues, blocking of the vestibule and crusting.

The first manifestation is the lupus nodule, a shot-like tubercle in the deeper layers of the skin, surrounded by an areola of hyperæmia. As the nodules increase in number, the skin becomes infiltrated with them, and tends to break down to form the lupus ulcer, which spreads in one direction as it heals in another. The granulations of the ulcer are exuberant, the edges are raised, and considerable destruction of tissue may ensue. The cicatrized surfaces are thin and vascular.

(2) Into the interior of the nose along the inferior turbinal to its posterior end, and so to the soft palate, naso-pharynx, pharynx, epiglottis and larynx (see pp. 88 and 137). The nasal septum is frequently attacked and perforated.

(3) From the floor of the vestibule through into the labio-alveolar angle and buccal cavity, passing by the gums to the hard and soft palate.

The tongue in front escapes, but the posterior third may be involved.

All these areas may either suffer independently or in combination. The disease, however, does not always progress by contiguity; thus the nose and larynx may both be affected without any obvious deposit in intervening regions.

In 6 per cent. of cases the lacrymal sac was implicated, probably by extension up the nasal duct. Enlarged submaxillary glands were found in 37 per cent. of the cases. (R. Weber.)

The deposit in the nose forms a pinkish, elevated infiltration having a granular surface, and bleeding when touched. The granulations are soft and velvety. Vegetations sometimes mimic papillomata, and tumour masses may occur, especially in the choanæ and the posterior surface of the soft palate.

Ulceration is active in the mouth, where the thickened mucosa breaks down to form small, rounded, or serpiginous sores.

Symptoms.—Lupus is an indolent, painless disease, and so it is often considerably advanced before the patient seeks relief, and then, in the case of the nose, persistent obstruction, with perhaps some crust-formation and a scanty, sanious discharge, or, it may be, a little bleeding, is all that he complains of.

When the mouth is attacked, the lips become thick and fissured, and the mouth itself sore and raw.

The disease is extremely chronic, and in the face of remedial measures often elusive and even intractable, springing up in a new area after it has been cured in the old.

Diagnosis.—The extremely slow progress, together with the traces of natural cicatrization, enables us to distinguish lupus of the nasal mucosa from cancer. Its microscopic characters, and the presence of nodules, differentiate it from the much rarer rhinoscleroma.

Prognosis.—As the islets of thin scar-tissue occasionally discovered by accident on the palate and elsewhere show, lupus sometimes undergoes spontaneous cure. But in the cases which reach the specialist, the disease tends to persist, and on the whole to advance, giving rise sometimes to extensive destruction and unsightly deformity. Whether it ever leads directly or indirectly to death, and, if so, in what proportion of cases, is at present unknown owing to the difficulty of following up individual cases throughout their lifetime.

Treatment. The treatment of cutaneous lupus by the Finsen light, by X-rays, or by chemical caustics, lies beyond our scope.

Lupus of the interior of the nose, when it is confined to one small area, may be excised like a tuberculoma. Otherwise, the nodules may be destroyed, methodically and in detail, by diathermy or galvano-cautery puncture.

Where the disease has spread to involve the greater part of the interior of the nose, curetting under an anæsthetic is the quickest and most satisfactory way of dealing with it. Scarring and the consequent tendency to closure of the anterior nares may be combated by the wearing of vulcanite tubes at night. The treatment must be repeated at regular intervals.

X-rays.—The Edinburgh statistics (R. Weber, *l.c. supra*) contain a warning: 22 cases of lupus developed epithelioma, and of these 17 had been treated by X-rays.

Radium.—H. M. Wharry and O. Teichman (*l.c. supra*) claim highly successful results from radium, after two years' experience. The details of their treatment may be summarized as follows:

Nose and Accessible Parts of Pharynx, etc.—Tubes containing 25 mgrm. of radium, screened with 1 mm. of silver and covered with rubber, are placed in contact with the lupus areas, fixed in position with flexible wire or dental wax, and retained for two hours at a time.

Palate.—Early cases are treated for one hour with unscreened plate applicators containing 10 mgrm. Ra. to the square cm., covered only with rubber.

Chronic cases and those already radiated are treated with plate applicators containing 5 mgrm. to the square cm., screened with 0.1 mm. of lead and covered with rubber, for 1-1½ hours.

Larynx.—Several of the same plate applicators, containing 5 mgrm. Ra. to the square cm., and screened with 2 mm. of lead, each containing 40-80 mgrm. Ra., are applied externally to the skin over the larynx, only a thin layer of cotton-wool being interposed. No damage to the skin results. From 100-200 mgrm. Ra. are used at each sitting of 5 hours' duration, repeated for from three to five days, according to the severity of the case.

These different methods are repeated at intervals of six weeks or two months, according to progress.

It is, of course, too early to say whether the application of radium is likely to favour the subsequent development of epithelioma.

Rhinoscleroma consists of a dense chronic infiltration and thickening of the mucous and submucous tissues of the nose attended with rhinoxerasia, and later, with cicatricial tissue-formation and contraction. It leads to great obstruction, and may spread to involve the soft palate, pharynx and larynx. The disease prevails in Poland and Central Europe, but is almost unknown in England. The treatment is symptomatic.

NEOPLASMS OF THE NOSE AND ACCESSORY SINUSES

Innocent growths—indubitably innocent growths—of the interior of the nose are quite rare, but growths of a sarcomatous or endotheliomatous structure in the ethmoidal region, generally reported by pathologists to be malignant, but not behaving clinically as such, are not so uncommon, and in addition epitheliomata appear which are of a more definitely malignant character. We shall discuss nasal neoplasms, therefore, as in three classes—innocent, locally malignant, and malignant.

INNOCENT NEOPLASMS

Papillomata, which are very rare, appear as red, soft, lobulated growths, sessile or pedunculated, generally attached to the lower turbinal or to the septum. They vary in size from a pea to a filbert, and are occasionally multiple. When large they give rise to epistaxis and may be mistaken for a malignant growth. Care should be taken not to mistake for true papilloma the fairly frequent lobulated hypertrophy of the inferior turbinal found in hypertrophic rhinitis (the so-called *pseudo-papilloma*).

Treatment.—The growth should be snared off under local anæsthesia, and the base, after the bleeding is stopped, touched with lunar caustic or the galvano-cautery, to prevent recurrence. Sometimes a papilloma is so large that lateral rhinotomy (p. 308) is necessary for its removal.

True Fibromata occasionally appear, of very slow growth and firm consistence. Pathologically and clinically they differ from the fibro-angiomata

of the naso-pharynx and posterior regions of the nose in being firmer and less vascular.

If the tumour is large, a *Rouge* or lateral rhinotomy operation may be necessary for its removal. (See p. 308.)

Angeioma (Bleeding Polypus of the Nose; Bleeding Polypus of the Septum) is perhaps the least uncommon of the innocent neoplasms of the nose. Situated on the septum near its antero-inferior angle, or on the inferior turbinal, it presents itself as a rounded, movable, purplish growth, rather like a small currant, but raw on the surface and bleeding readily when touched. Frequent and prolonged epistaxis is indeed the invariable symptom of its presence.

Treatment.—Imperfect removal causes more bleeding, and is followed by recurrence.

The simplest and most reliable plan is, under cocaine-adrenalin paste anæsthesia to make an incision through the mucosa clear of the growth down to the cartilage or bone in such a way as to encircle the base of the growth. The whole mass can then be raised off the cartilage by means of an elevator and entirely removed without any hæmorrhage. The raw surface left soon heals over.

Osteoma of the ivory type appears as a rarity in the frontal sinus, and giving rise by its growth to pain and swelling, may require removal through an external incision.

Mucocele is a not uncommon disease of the sinuses, usually of the ethmoidal or fronto-ethmoidal, and less commonly of the antrum.

It used to be supposed that a mucocele was produced by atresia of the sinus orifice and retention of the normal mucous secretion in the sinus cavity. But the modern belief is that a mucocele is a mucous cyst (and that in turn is a form of adenoma), which, undergoing active enlargement, leads to a distension of the bony walls of the sinus and their slow atrophy.

Symptoms.—In the frontal and fronto-ethmoidal region, the growth of the cyst leads to the appearance of a smooth, painless, rounded swelling of the roof or inner wall of the orbit. The tumour, in growing, may cause considerable displacement of the globe, but so slow is the rate of growth that the eye accommodates itself to the new position, and diplopia is rare.

The tumour feels tense and elastic on palpation, and crackling of the thinned, expanded bone may be perceptible on pressure.

In the lower ethmoidal region the direction taken by the enlarging cyst leads it towards the interior of the nose, where it appears like a large or cellular middle turbinal.

Treatment. Mucocele of the *Frontal Sinus* must be removed through an external incision. The cyst proper is exposed by removing as much of its egg-shell covering as is necessary, and if it can be entirely removed, the wound may be closed up again without breaking down the infundibulum to effect nasal drainage.

In the *Fronto-Ethmoidal* region, it is often possible to open into the cyst from the nose, removing as much of the sac as will prevent the reconstitution

PLATE II.





PLATE II.

Interior of base of cranium showing an adeno-carcinoma of the ethmoids invading the endocranium through both cribriform plates.

The yellowish sausage-like masses represent the neoplasm, which had found its way into the cranium along the lymphatic spaces surrounding the branches of the olfactory nerves. The posterior mass on the left, reddish in colour, is growth covered with granulations; it is continuous with the growth in front. The reddish mass situated anteriorly and on the right was composed entirely of granulation-tissue.

The growth had thus invaded the pia arachnoid by way of the olfactory nerve lymphatics, but the dura otherwise was intact. The convolutions of the brain were indented but not invaded by new-growth.

Death was caused by purulent meningitis.

(Case of the author, dissected and described by Dr. G. Scott Williamson, 'Proc. Roy. Soc. Med.,' Sect. of Laryng., vol. xx, p. 1087. Drawing by Miss H. M. Cunningham.)

of the cyst. Quite frequently, considerable areas of the bony orbital wall will be found to have melted away under the pressure atrophy.

In the *Lower Ethmoidal* region, the diagnosis usually comes as a surprise, when, in the act of removing what seems to be a distended middle turbinal, a cavity is broken into containing a white opaque liquid. As much of the thin bone and sac wall as can be reached should be removed.

LOCALLY MALIGNANT NEOPLASMS

are found usually in the upper ethmoidal region of the nose. Microscopically their structure is that of fibro-sarcoma or round-celled sarcoma, with large blood-spaces; some pathologists classify them as endotheliomata. In their growth, which is rapid, they erode bony walls, such as the septum nasi, the wall of the orbit, and the nasal bones, and frequently form attachments as they spread to various parts of the nose. They seem to spring most frequently from the cribriform region and grow downwards into the nose, but the cribriform also may be eroded by their growth, and the dura laid bare in the roof of the nose.

The growth, as a matter of fact, when it passes through the cribriform into the cranium, behaves like the bacteria of sepsis, that is to say, it extends along the lymphatic channels that surround the filaments of the olfactory nerve. In this manner it insinuates its way into the subdural space, and by favouring the invasion of septic organisms, leads to acute purulent meningitis. (See Plate II.)

Direct erosion of the intact dura by the growing tumour is less prone to occur, as that membrane offers considerable resistance to the extension through it of neoplastic tissue, just as it does also in the case of the bacteria of sepsis.

This class of tumour resembles the naso-pharyngeal fibroma in its unrestrained local growth, in its tendency to erode bone and to form connections as it spreads, and also in its vascularity and readiness to bleed profusely. For that reason, in spite of the fact that the naso-pharyngeal fibroma sometimes stops growing spontaneously and undergoes involution while the nasal tumour does not do so, it is possible that these two classes of tumour may be fundamentally akin.

Symptoms.—The earliest symptom is epistaxis, generally profuse and hard to locate on ordinary anterior rhinoscopy. Epistaxis emanating from the ethmoidal regions should always be regarded with suspicion. Later, a watery or muco-purulent and often foetid discharge appears, unilateral as a rule, and pain may be experienced, although it is not a common symptom.

The tumour makes its first appearance according to the direction it takes. When it grows downward, it appears in the nose as a grey, fleshy, lobulated mass, often movable, and very tender, and bleeding freely when touched.

Or it may erode the inner wall of the orbit, and cause displacement of

the eyeball sometimes with diplopia, projecting into the orbit, where, on deep pressure, it can be felt as a fleshy swelling.

Again, the nose on rhinoscopy may appear to be normal, and the first appearance of tumour growth be visible on the exterior of the nose, the tumour having made its way through the nasal bone or ascending process of the superior maxilla. In this development it may lead to broadening of the root of the nose.

In advanced cases these various extensions exist in combination.

If allowed to proceed unchecked, the growth causes death either by erosion of the invasion of the lepto-meningeal spaces and meningitis, or as a result of the continual severe hæmorrhages and consequent anæmia. But if radically removed by operation it may never recur again.

Secondary deposits outside of the nose do not occur.

MALIGNANT NEOPLASMS

In character, malignant growths of the nose belong to the adeno-carcinomatous or epitheliomatous group of tumours. When the microscopic appearances of the tissue are those of the sarcomatous group, the malignancy, as we have just seen, is usually less virulent, and the prognosis is rather less anxious.

Malignant growths are most commonly found in the ethmoidal region (where, however, the sarcoma seems to be more frequent than the carcinoma); the maxillary antrum; the floor of the nose; and the septum, especially on the edge of a perforation. But, as a matter of fact, cancer may originate in any part of the nasal cavity, and it may also be found that the nasal cancer is merely an extension of a growth originating elsewhere, as in the naso-pharynx.

Symptoms. The symptoms are the same as those we have just described in the section on the locally malignant neoplasms of the nose, but in addition, glandular enlargement may accompany the growth in the nose; emaciation will be more rapid; and, above all, recurrence after radical removal is probable.

It often happens, as when the growth comes under our notice early in its course, that the diagnosis must depend entirely upon the microscope, but the situation of the tumour and its duration and speed of growth may give some information. Thus, a rapidly growing neoplasm of the antrum is usually highly malignant, and the chances are correspondingly poor, all the more so if the growth has attacked the bone and infiltrated the soft tissues of the cheek, or if it has found its way into the cavity of the nose or into the orbit.

Diagnosis.—Simple mucous polypi may appear in consequence of a malignant growth hidden away somewhere in the background, in which case the presence of the latter may never be suspected until more obvious signs arise. If mucous polypi are associated with frequent epistaxis or

with a sanious offensive discharge, the possibility of malignant disease ought to occur to us. But when sarcomatous or carcinomatous masses themselves assume a polypoid form, they are easily distinguished from the simple mucous polypi by being fleshy, very vascular, and tender on probing.

Recurrent epistaxis from malignant disease may be mistakenly attributed to simple septal hæmorrhage or to some general disease. For that reason it may be laid down as a clinical rule of practice : **when there is epistaxis, do not rest satisfied until you have actually located the bleeding spot.**

A syphilitic gumma responds rapidly to treatment, and shows no tendency to exuberant overgrowth as do the cancerous neoplasms.

Cancer of the Maxillary Antrum.—The earliest symptom is frequently pain in and radiating from the corresponding cheek or teeth. It is often neuralgiac in character, and may be very severe. At the same time, or a little later, a unilateral foetid nasal discharge appears, and there may be some nasal obstruction.

Even at this early period anæsthesia of the skin supplied by the infra-orbital nerve may be discovered, and insensitiveness of the teeth of the same side—a suspicious sign, when present.

Later, the growth erodes the bony walls of the antrum and extends in any one or all of the following directions : (a) Through the anterior wall into the soft tissues of the cheek, where it can be felt from without or on palpation of the canine fossa through the mouth ; (b) into the nasal cavity, giving rise to the appearances already described ; (c) through the floor of the orbit, where its extension may be detected by the finger pressed deeply under the globe ; (d) into and through the bone of the hard palate, producing swelling and ulceration in the roof of the mouth.

The *prognosis*, even after removal by operation, is bad.

Diagnosis.—Prior to its invasion of the bony walls, cancer of the antrum is often mistaken for simple purulent sinusitis. But the dullness on transillumination and the X-ray shadow are more dense in cancer. On proof-puncture the needle sometimes slips with unusual ease into the antrum, and it is usually only blood that is washed out.

After the bony walls have yielded it is sometimes confused with a dental cyst invading the antrum (see p. 634).

Treatment.—Radical removal of the growth and its extensions is necessary, whether it is malignant or only semi-malignant. This is effected by one or other of the following operations, according to its situation and size.

Small growths, such as epitheliomatous ulcers on the septum, or on the inferior turbinal, may be radically removed by intranasal operation, the tumour, along with a sufficiency of the healthy tissue around it, being eradicated in one piece.

In the majority of cases, however, satisfactory access to the neoplasm can only be obtained by one of the following external operations.

LATERAL RHINOTOMY (MOURE'S OPERATION)

Description.—The exposure of the nasal cavity through the side of the bridge of the nose.

Indications.—Malignant or other tumours of the ethmoidal and sphenoidal sinus regions, and of the naso-pharynx.

Operation.—The patient lies on the back with head and shoulders a little raised. The surgeon stands on the side to be operated on. The anæsthetist sits opposite to the surgeon. The anæsthetic (chloroform) is administered at first on a mask, later through a Junker apparatus. The assistant stands at the head of the table.



FIG. 129.—Moure's Incision for Lateral Rhinotomy.

Preparations must be made to cope with free hæmorrhage. To this end at least a dozen marine throat-sponges on George holders are got ready and placed in charge of a nurse, whose sole duty is to attend to them. The skin of the face is prepared by iodine-spirit solution.

If the growth is in the ethmoidal region, the posterior naris is blocked by means of a strip of gauze inserted through the nose. This, if practicable, is less likely to embarrass respiration than a captive sponge in the naso-pharynx. A tampon soaked in adrenalin solution (1-1000) is inserted into the ethmoidal region, and is placed against the inner surface of the nasal bone. The anterior naris of the side operated on may be packed during operation with gauze, to prevent the blood running down and inconveniencing the anæsthetist.

With these arrangements, the whole of the blood will emerge at the operation-opening in the side of the nose.

Otherwise, the anæsthetic may be given through a laryngotomy opening

(p. 200), the pharynx and naso-pharynx being packed with captive sponges or gauze. Or, better still, ether is given by the intra-tracheal method, the air-blast being used.

Having surrounded the operation-field with sterile cloths, disposed so as to allow the anæsthetist access to the mouth and one eye, an incision is made as figured in Fig. 129; that is to say, from the inner end of the eyebrow, curving round the inner margin of the orbit, and thence straight down along the junction of the side of the nose with the cheek to the ala of the nose, curving round the junction of the ala with cheek and lip, and so into the floor of the vestibule. A second incision is sometimes made proceeding from the first incision at the level of the inner canthus, and curving along



FIG. 130.—Lateral Rhinotomy. The simple incision.

the lower margin of the orbit to the junction of the middle and outer third of that margin. This second incision is, however, unnecessary unless the growth extends below the level of the middle turbinal; it is open to the objection that its scar produces permanent œdema of the lower eyelid. Indeed, in most cases, a simple and straight vertical incision will be found to be sufficiently long without the curve round the ala. (Fig. 130.)

In any case, the skin incision is rapidly deepened until the bone is exposed, and the angular artery and vein and several other branches of the facial vessels which are divided are clamped.

The flap marked out by the incisions is reflected by means of an elevator, and the soft tissues on the side of the bridge of the nose are similarly raised up to the middle line, both being held aside by retractors. The nasal bone and the ascending process of the superior maxilla are now completely exposed.

By means of bone-cutting forceps, inserted under the lower edge of the

nasal bone at the pyriform aperture, the bones are rapidly nibbled away, exposing the lining membrane of the nasal cavity. As much bone is removed as is necessary to give free access to the nose, but care is taken to avoid the lacrymal bone and sac and the infraorbital nerve and vessels, while the bone of the dorsum of the nose is also left in order to maintain the bridge.

If the lower region of the nose is to be exposed, the incision round the



FIG. 131.—Scarcely Perceptible Scar of Lateral Rhinotomy. Operation was performed for ethmoidal epithelioma—untouched photograph. 1927: Patient still alive, 12 years after operation.

ala is deepened until it enters the vestibule, and then the whole point of the nose can be displaced to the opposite side.

Incision of the lining membrane of the nose from without by knife or scissors lays the interior of the ethmoidal region open to inspection, so that the situation of the growth in front can be clearly made out.

Keeping between the lining of the nose and its bony wall, if that bony wall is still uneroded, the tumour is undermined and separated, in one mass if possible, from the lamina papyracea of the orbit and the cribriform plate above.

Finally, by means of a long, sharp spoon, its connections posteriorly are detached, and the tumour mass is removed through the opening in the side of the nose.

This process of separation and removal is attended with very free hæmorrhage, but, as in all nasal operations, the surgeon does not pause to arrest it : he hastens on to the completion of his task, knowing that the bleeding will not cease until all the pathological tissue has been removed.

In growths which previous examination has shown to be very vascular, the external carotid should be ligatured, or exposed and clamped until the growth has been removed.

The final step is to wipe out and to inspect the interior of the nose in order to make certain that all the tumour growth has been removed. Special regard must be paid to possible extensions of the growth into the orbit, into the cranial cavity, or into the antrum or sphenoidal sinus, such extensions, if found, being followed up and removed by blunt elevation and separation. It sometimes happens that what at first sight may seem to be an extension of the growth, proves to be in reality the original starting-place and main mass of the tumour, necessitating a much wider removal than had been anticipated, with a fresh renewal of the hæmorrhage.

The growth and its extensions having thus been thoroughly removed, the skin-flaps and incisions are brought accurately into apposition and sutured with fine silkworm gut or horsehair.

A collodion dressing is sufficient, as healing of the face wound takes place with rapidity. The scar is inconspicuous, and the gap in the bone does not lead to any depression of the surface. (Fig. 131.)

The gauze strips are removed from the nose as soon as the operation is finished, and are not re-inserted unless there is a continuation or recurrence of hæmorrhage.

Results.—The immediate results are excellent, the operation-mortality not being high—under 8 per cent. in the cases collected. The remote results depend upon the nature of the growth and the thoroughness of its removal.

The patient is kept under observation, and if a recurrence is detected, it may be removed with a curette under nitrous oxide or even local anæsthesia. In the less malignant forms, the methodical destruction of such colonies as these which had escaped the first operation will finally lead to cure.

In the more malignant growths, if recurrence takes place, it does so both locally and in the lymphatic glands of the neck, and leads finally to death.

ROUGE'S OPERATION

Description.—The reflection upwards of the upper lip and point of the nose to give access to the lower parts of the nasal cavity through an incision beneath the upper lip.

Indications.—Rouge's operation was originally planned for the removal of large syphilitic sequestra from the floor of the nose. It is now used for extensive growths about the floor and inferior meatus of the nose.

Operation.—Preliminaries as for the radical antrum operation. (See p. 346.)

The upper lip being turned up, an incision is made along the gingivolabial recess, having its middle at the frænum of the upper lip, and extending as far as the level of the first bicuspis tooth on either side. The incision is carried down to the bone, and by means of an elevator, the soft tissues are separated from the osseous margin of the pyriform aperture.

The lining of the nose is cut around the aperture to give access to the inferior meatus, and with scissors or knife the cartilaginous septum is cut through from the anterior nasal spine below to just under the bridge above. This, with a little further clearance laterally, permits of the upper lip and the point of the nose being detached in a flap upwards, where it can be held by an assistant while the nose is being cleared.

A sponge in the naso-pharynx may be required to prevent blood finding its way into the pharynx, but in this operation also it may be possible to block both posterior nares with gauze.

The nose, having been cleared of new growth, the point of the nose and the lip are replaced, the edges of the wound in the mouth being secured by sutures. The septum wound does not require stitching.

REMOVAL OF THE SUPERIOR MAXILLA

may be required when the maxillary antrum is the seat of epithelioma.

Position.—The patient lies on his back with head and shoulders raised.

The *Anæsthetic* (chloroform) may be administered through a Junker tube: through a laryngotomy opening: or by the intra-tracheal method.

One or two surgeon-assistants are required. The operator stands on the patient's right hand.

Operation.—The upper lip is first of all completely divided in the middle line from the columella to the free edge of the prolabium. While the surgeon is so doing an assistant compresses the lip and with it the coronary arteries on either side of the middle line. After the lip is divided, the arteries are at once caught.

From the upper end of the lip incision, an incision passes along the lip across the floor of the nasal vestibule outward to the edge of the ala, and thence round the ala, and up alongside the nose to a point half-an-inch below the inner canthus of the eye. From the upper end of this incision, a second incision is made along the lower margin of the orbit to near the outer canthus.

These incisions are rapidly deepened to the bone, the vessels met with being secured by forceps: they include the angular artery and vein, the lateralis nasi artery and some smaller branches. Bleeding is lively for a few moments, but the points are easily seen and caught. The soft tissues of the cheek are raised from the bone by dissection.

The maxilla is now to be separated from its bony attachments.

First, the edge of the pyriform opening is cleared with the knife, and the

nasal process is cut through with a fine saw, between pyriform opening and orbit.

The lower edge of the orbit is next defined, cleared, and the periosteal floor of the orbit raised, and the bony floor is cut through from the point where the nasal process has been divided to the spheno-maxillary fissure by means of a fine chisel. Next the malar bone is divided with a saw from the surface to the spheno-maxillary fissure, the division running obliquely downwards and outwards.

The palatal attachments remain. For their severance, the central incisor tooth on the diseased side is removed, and the mucous membrane and periosteum of the hard palate is divided in the middle line from the incision in the lip as far back as the soft palate.

The soft palate is left behind, and for its separation, a transverse incision, starting from the posterior end of the median palatal incision, is carried right through the soft palate.

(Sometimes it is possible to save the muco-periosteal roof of the mouth.)

An incision made with a long-bladed knife is carried through the muco-periosteal floor of the nose throughout its whole antero-posterior length, from the incision in the lip. Through this nasal incision a fine saw effects from above downwards the division of the hard palate.

Finally, with lion forceps holding the bone by the alveolus below and the orbital palate above, the bone is wrenched out and freed of its other bony connections. Some soft tissue attachments at the back usually also require division with scissors. Bleeding points in the cavity are caught and ligatured if possible, but what bleeding there is usually stops after firm packing with iodoform gauze.

The skin incision is finally closed, the cheek-flap covering the gap in the facial skeleton.

After-Treatment.—The packing is removed in twenty-four hours, and not again inserted unless required for hæmorrhage. The cavity may be douched out daily from the mouth.

General Results of Operative Treatment.—(Statistics are scanty.) Of 50 cases, collected from various sources, only 3 died of the operation. Of 16 with sarcoma or endothelioma, 5 had no recurrence up to three years after operation; one had a delayed recurrence but was alive several years later. Of 34 with epithelioma, 4 had no recurrence; one had a delayed recurrence, but was alive several years after. This gives approximately 37 per cent. of non-recurrences in sarcoma or endothelioma, and 15 per cent. of non-recurrences in epithelioma.

Palliative Treatment: X-rays.—Finzi ('Journ. of Laryng.,' vol. xxxvii, p. 302) first of all sterilizes the growth-area, which is generally septic, by means of copper ionization. The following day a measured dose of the intense rays is administered, and repeated again in six weeks if the condition of the blood permits, and once again in eight weeks. The best results have been obtained in round-cell sarcoma, and the poorest in epithelioma.

After exposure to the rays the tissues are so severely damaged that operation is inadvisable until after the lapse of a month or more.

Radium has little effect in epithelioma. In sarcoma and endothelioma, however, it has proved of value, especially when combined with excision and diathermy. (W. D. Harmer, 'Journ. of Laryng.,' vol. xxxvii, p. 300.)

NASAL NEUROSES

Anosmia.—Loss of the sense of olfaction may be (1) *obstructive* or (2) *perceptive* in origin.

1. Any cause hindering or preventing the access of odoriferous particles to the olfactory region of the nose—which occupies quite a small area in the roof, septum and upper ethmoidal region—such as hypertrophic rhinitis, hypertrophy of the middle turbinals, polypi, and other swellings and tumours, will induce hyposmia or anosmia, and the treatment consists in the removal of the obstruction.

2. Of the perceptive variety, the causes may be (a) *local*, as in atrophic and other forms of rhinitis, which injure the end-organ of the olfactory nerves; (b) *neuritic*, as after influenza; (c) *central*, from hysteria, tabes dorsalis, general paralysis of the insane, basal meningitis, cerebral tumours, etc.

The treatment of this variety is unsatisfactory, and save when it is due to local inflammatory causes, the return of the sense should not be expected.

Hyperosmia, or hypersensitiveness of olfaction, is sometimes complained of in hysterical affections.

Parosmia—perverted sense of smell—occurs in some forms of insanity.

Cacosmia—the subjective sensation of fœtor—is not infrequently experienced by sufferers from accessory sinus suppuration. Objective fœtor—that is, fœtor which is imperceptible to the patient, although everyone else may be aware of it—is one of the characteristics of ozænatous rhinitis. (See p. 294.)

Nasal Headache. Headache is a common symptom of nasal disease in general and of nasal sinus disease in particular (p. 331). At present we are dealing with neuralgic headache and pains, and with what is called "vacuum headache."

Trigeminal Neuralgia, as L. H. Pegler has pointed out, may be induced by irritation radiating from any point of pressure within the nose. In addition, it is also occasionally due to nasal sinus suppuration.

Attention has also been called to a reflex occipito-mastoid pain, sometimes associated with torticollis and rigidity of the cervical muscles (Vidian neuralgia) in ethmoidal or sphenoidal sinusitis.

Lastly, pain as far afield as the shoulder, arm, and hand (the "Bliss syndrome") has also been found to be due to nasal sinus suppuration. (J. C. G. Macnab, 'Journ. of Laryng.,' vol. xxx, p. 334.)

Naturally enough the real cause of the neuralgia in such cases is seldom

discovered unless the patient is submitted to a thorough examination of the nose and sinuses. But once the causative disease is revealed and treated, cure quickly follows.

Vacuum Headache.—Under this name Greenfield Sluder has brought to notice cases of severe frontal or supra-orbital pain in which no sign of sup-puration of the frontal or other sinuses is discoverable. As the pain is got rid of by removing the anterior end of the middle turbinal or by enlarging the fronto-nasal duct (p. 331), Sluder supposes that it is due to blockage of the duct, with the consequent absorption of the air enclosed in the sinus.

Cerebro-Spinal Rhinorrhœa.—The discharge of cerebro-spinal fluid from the nose without any discoverable wound or opening in the dura mater and roof of the nose has been described by Sir StClair Thomson. It is a rare condition. The rhinorrhœa is generally unilateral, and the flow is almost continuous for weeks, months or years. Headache and symptoms referable to the central nervous system may be present. The diagnosis is made by collecting and testing the fluid. The character and reactions of cerebro-spinal fluid are: A low specific gravity (1003 to 1004); an absence of albumen, or if it is present, there is no more than a trace; and the property of reducing the copper in Fehling's solution, showing the presence of glucose (see also p. 579).

The route by which the cerebro-spinal fluid enters the nose is unknown, but a similar leakage from the ear, subsequent to mastoid operation, has been recorded by several observers, in which the fluid seemed to emerge from a pin-point fistula in the dura mater. StClair Thomson, in one case of cerebro-spinal rhinorrhœa coming to post-mortem, found a syphilitic pachymeningitis.

There is no method known of stopping the flow. Operation on the nose for any reason is contra-indicated in view of the obvious risk of setting up septic meningitis.

NASAL AND BRONCHIAL SYMPTOMS DUE TO ANAPHYLAXIS

Although formerly numbered among the nasal neuroses, the modern view of *paroxysmal rhinorrhœa*, *hay-fever* and bronchial *asthma* is that they are different manifestations of anaphylaxis, induced by any one, or by several of a large number of foreign proteid substances, including pollens (for hay-fever), animal exhalations, food-stuffs and bacterial toxins.

Generally speaking, foreign proteids capable of producing anaphylactic phenomena induce a tonus reaction on unstriated muscle, hence bronchial asthma; and a vaso-dilator action on capillary endothelium, hence urticaria and, probably, vaso-motor rhinorrhœa. Advantage is taken of the latter phenomenon to test substances suspected of being the cause of symptoms by rubbing them on the abraded skin, a positive reaction, shown by an inflammatory blush round the site, indicating the presence of a morbid agent.

Clinically the testing-process is of necessity slow, no fewer than

10 pollens (for hay-fever), 70 different food-stuffs, 20 bacterial proteids and 10 kinds of animal hairs being employed by F. Cole. ('Brit. Med. Journ.,' March 12th, 1921.)

Apart from such methodical testing, the history of the case may reveal the particular poison. Thus the limitation of the symptoms to some weeks in the summer would indicate the cause to be a pollen—or pollens, for it has been found that a patient may react to more than one. In like manner, the patient may be aware of the evil influence exercised upon him by horses or other animals. It is a curious fact that the exhalation of one human being may excite asthma in another.

With regard to the so-called horse-asthma, which is by no means uncommon, and which may be evoked by ordinary street-dust, it is important to note that such people are peculiarly susceptible to the influence of horse-serum, and are made seriously ill if they receive diphtheria antitoxin, or other antitoxins made of horse-serum.

If the history throws suspicion upon a certain proteid and the suspicion is confirmed by a positive skin-reaction, cure will follow if the proteid can be eliminated; a domestic animal, for example, may be got rid of; flock may replace feathers in pillows; some unimportant foodstuff may be cut out of the dietary, and so on. But it may be impossible to eliminate the cause. The deleterious foodstuff may be essential to life—flour, for example, is sometimes responsible. Or the human irritant may be a near relation! In such cases the tissue-resistance of the patient may be heightened to the point of tolerance by submitting him to a series of hypodermic injections made from the morbid agent and used in increasing doses like a vaccine. The vaccine treatment is, however, often uncertain in its results. It is most successful in the young.

Not every case, however, will react positively to some one or two of the long list of possible irritants known to us. Thus only about 50 per cent. of all cases of bronchial asthma can be traced to some such agent. As to what it is that induces the symptoms in the others we do not yet know precisely. Obviously, they also may be due to some toxin so far undiscovered. It is to be noted that heredity plays a large part in the ætiology of all, since not only do the symptoms of this latter group run in families, but it has been found that the hypersensitiveness to proteids itself is hereditary.

VASO-MOTOR RHINORRHOEA (PAROXYSMAL RHINORRHOEA; VASO-MOTOR RHINITIS)

In this condition a thin, serous fluid is poured out from the middle turbinal and the upper regions of the nose. (As a matter of fact, thin, watery nasal secretions always do proceed from the ethmoidal region.)

The condition is common and its cure uncertain.

Symptoms.—At a certain period of the day, usually after getting up in the morning, the patient is seized with an intense irritation in the nose,

which sets up violent and prolonged sneezing, attended with a free flow of watery fluid from both nostrils, sometimes with irritation and lacrymation in the eyes, and occasionally also with wheezing in the chest, with coughing, and even with definite asthmatic breathing.

The paroxysm lasts for about half-an-hour or an hour, gradually subsiding and disappearing until next day about the same time, although in some cases the tendency to recurrence persists all day, and a fresh attack is set agoing by trivial causes.

On examination, the nose, during the attack, is seen to have the turbinals pale, watery and swollen.

The disease presents the same phenomena as hay-fever, but it differs from hay-fever in continuing all the year round, and in being as severe in winter as in summer. It lasts for many years, and it is liable to lead to



FIG. 132.—Granular Œdema of the Septum in Long-standing Paroxysmal Rhinorrhœa.

serious secondary results, as multiple polypi sometimes form, and the nasal mucosa undergoes a typical and peculiar change of what may be termed "granular œdema." (See Fig. 132.) This condition still further aggravates the severity of the attacks.

Diagnosis.—We have already indicated the distinction between hay-fever and paroxysmal rhinorrhœa, and the characteristic sequence of events as we have described them renders diagnosis easy.

Prognosis should be guarded. Sometimes local operative treatment cures; or the attacks may be modified by attention to general health, or by drug treatment. Sometimes the attacks defy all remedies.

Treatment.—The case may be tested and treated according to the principles we have just laid down. If the septum shows a deflection or spur, and if the turbinals are enlarged or polypoid, local treatment directed to the removal of these abnormalities may be followed by great relief. In the condition of granular œdema it is advisable also to perform submucous resection of the septum, even if it is not deviated, as experience shows that

the operation may effect considerable improvement in the attacks. It is necessary to add, however, that such operations have only a palliative influence; they do not cure the disease.

Alexander Francis recommends light cauterization of the septum for this disease, as he does for asthma. - (See also p. 319.)

If local measures fail, or seem to be unnecessary, benefit may be obtained from belladonna or atropin internally, from potass. iodid. in small doses, or from calcium chloride or lactate in large doses. (N. Maclay.)

Auto-serum.—A novel method of treatment is recommended by D. Lee ('Journ. of Laryng.,' vol. xxxviii, p. 28). He takes 20 c.c. of blood from the patient's vein, receiving it in a sterile test-tube, which is then corked with cotton-wool and left at ordinary indoor temperatures for 6-12 hours. The blood having coagulated, he detaches the clot by tapping the tube, and transfers the 5 or 6 c.c. of serum to another test-tube. A half rising to $2\frac{1}{2}$ c.c. of the serum are injected hypodermically daily until the eighth day. Of 17 patients so treated, he reports 11 cures.

HAY-FEVER (HAY ASTHMA)

Hay-fever is a specific disease due to a substance in the pollen of certain grasses and other plants which has a toxic and irritating effect on the nasal, conjunctival, and bronchial mucous membranes of those susceptible.

Hay-fever first makes its appearance about puberty. It is a hereditary weakness, and ruins the summer for its victims.

In Britain, the yearly recurrence of the attacks sets in about the middle of June or earlier, and continues for about six weeks. The paroxysm appears suddenly with signs of conjunctival irritation—itching of the eyelids and lacrymation. From the eyes the irritation rapidly spreads to the nose, inducing rhinorrhœa, violent and repeated sneezing, with nasal obstruction and all the early signs of a severe coryza. The attack lasts on and off for several weeks, being liable to paroxysmal exacerbation every time the patient is exposed to the influence of the pollen dust. Asthma, also sudden and paroxysmal in character, may attend the paroxysm.

Examination of the nose during the attack shows it to be absolutely blocked by a pale livid swelling of the inferior turbinals.

Prognosis.—The chances of relief from the yearly attack of hay-fever are not good, unless the patient responds to the use of pollen-vaccines.

Treatment.—We have already alluded to the efforts made to work out a specific immunity treatment for hay-fever, especially by J. L. Goodale, of Boston, U.S.A., and F. Cole in England. The vaccine treatment is most useful when employed during the weeks preceding the expected onset of the symptoms.

Apart from such therapy, the patient may obtain some relief by wearing during the season a respirator lined with damp gauze, and by inserting a drop of castor oil into the conjunctival sac in the morning.

When the attack sets in, it may be checked by a drop of sol. adrenalin

in the conjunctival sac, and by spraying adrenalin (1 10,000, freshly made) into the nose, if possible before the swelling has obstructed the passages.

Local operative treatment, if required for obstruction, should be carried out, but it has no effect upon the hay-fever as such.

ASTHMA AND NASAL DISORDERS

A certain proportion of sufferers from asthma manifest nasal abnormalities, such as spurs, deviations of the septum, polypi, or such conditions as paroxysmal rhinorrhœa or hay-fever.

In a few of these cases, the cure of the nasal disease results in the cure of the asthma. In a larger number the removal of the nasal abnormality is followed, not by cure, but by a moderation in the severity of the asthma, so that although the attacks do not cease, they are more easy to endure. In a few cases the cure of the nasal disease has no effect whatever upon the asthma, and cases have even been recorded where the nasal treatment seemed to have made the asthma worse.

If the history shows that the asthma and the disease in the nose appeared at the same time, such as may be found not infrequently in a case of nasal polypi, the chances of curing the asthma are good, and those chances are all the better if the duration of both disorders has been brief.

Again, if an asthmatic patient is found to have a deviated septum or a septal spur, or an enlarged middle turbinal, especially if points are visible where two opposing surfaces are in contact, nasal operation may lead to considerable relief from the asthma, and sometimes even to complete cure. It is not justifiable to perform any surgical operation upon the nose in asthma unless some undoubted nasal abnormality or disease is present. But this injunction does not apply to—

Cauterizing the Septum, as Alexander Francis has described it.

Method.—Under light cocaine anæsthesia, a fine galvano-cautery terminal is brought to a cherry-red heat under inspection within the nose. But it is not placed in contact with any surface until the electric current is shut off, and then just as the platinum terminal is ceasing to glow, it rapidly and lightly touches the septum at a spot approximately on a level with the anterior end of the middle turbinal. Hereabouts one quite commonly finds in asthmatic people an œdematous patch, but often no such indication of abnormality is visible.

Results.—If one is fortunate enough to hit the right spot, the effect of this gentle cauterizing upon the asthma is said to be surprisingly good. My results, personally, have not equalled those claimed on good evidence by Francis, but I have sometimes obtained a decided and prolonged mitigation in the severity of the attacks.

Francis lays stress upon the feather-touch of the cautery, and believes the improvement to be due to a reduction in blood-pressure reflexly brought about by the cauterization.

The Adrenalin Treatment of Asthma.—(a) *Intranasally.*—A freshly

made solution of adrenalin chlor. in water (1-10,000 or stronger) may be sprayed into the nose at the outset of an asthmatic paroxysm with benefit.

(b) *Hypodermically*.—Striking and immediate relief to the bronchial spasm follows the hypodermic injection of from five to eight minims of sol. adrenalin. chlor. (1-1000), and its repeated and continued use does not seem, so far as recent reports go, to be productive of any ill-effects, except a severe headache when too large a dose is employed. A patient of mine herself took mxx of sol. adrenalin, 1-1000, ten times a day for three months, without any evil results. (She was finally cured by a successful and permanent removal of nasal polypi.) Adrenalin is therefore preferable in every way to cocaine or morphine.

In operations under general anæsthesia upon asthmatic patients, a paroxysm usually sets in as the patient is recovering from the anæsthetic, and alarming cyanosis may develop. A timely hypodermic of adrenalin removes the dyspnoea as if by magic.

Results of Nose and Throat Operations in Asthma (Edinburgh Royal Infirmary Statistics, A. Logan Turner and M. C. Tod, 'Journ. of Laryng.,' vol. xl, p. 582).—Of 173 cases investigated, 10 per cent. were cured of asthma, 44 per cent. improved and 45 per cent. remained as before. The best results were obtained in young people, not children, and followed the removal of tonsils and adenoids. Submucous resection of the nasal septum and the removal of polypi were also beneficial. Francis's cauterization of the septum was considered unsatisfactory.

Nasal Cough is the name given to paroxysmal coughing which is due to irritation of some part of the interior of the nose. It is thus sometimes associated with asthma, and may indeed form one item in the asthmatic syndrome. Again it is not infrequently associated with sneezing and lacrymation independent of any bronchial disturbance. And finally, the cough may be the only symptom present.

As to the nasal disorders that induce the symptom, mucous polypi will sometimes be found to be responsible, or it may be due to turbinal hypertrophy, or to a septal spur or deviation. At other times, no abnormality may be discoverable apart from hyperæsthesia of the mucosa.

In the last variety it is sometimes possible to evoke the cough, and so to assure oneself of the diagnosis, by touching certain spots in the nose. Cocaine naturally is not employed, and the agent used is a cotton-wool-covered probe. The touch must be gentle.

The spots are : The anterior end of the inferior turbinal ; the posterior end ; the corresponding area on the septum ; the anterior end of the middle turbinal and the opposite area on the septum (the *tuberculum septi*—the same region as is cauterized by Francis for asthma) ; and finally the orifice of the Eustachian tube. If touching any of these spots sets up coughing, lacrymation, sneezing or other signs of excessive reflex reaction, nasal hyperæsthesia may be diagnosed, and may be treated by local applications of the cautery.

Otherwise the treatment is that of the causative disease or anatomical abnormality.

Synechiæ of the Nose are adhesions which have formed across the nasal passage between septum and turbinals or lateral wall. They are usually due to adhesion of two opposing surfaces denuded by operative measures or by disease, but sometimes no cause can be assigned for their presence. They vary from thin friable threads to thick obstructing bands of dense fibrous tissue.

Symptoms.—Sometimes synechiæ induce no symptoms. At other times they seem to cause an amount of obstruction out of all proportion to their size. If extensive, they naturally produce considerable nasal obstruction.

Their presence may interfere seriously with the examination and treatment of a nasal disease.

Prognosis.—The adhesions most difficult to get rid of are those which form in the ethmoidal region after operation, as the nasal passage is here narrow. Their formation may tend to prolong sinus suppuration by blocking the sinus openings and impeding drainage.

Post-syphilitic synechiæ, wherever situated, are also very obstinate, and apt to re-form after removal.

Treatment : Preventive.—All operations on the nose should be performed in such a way as to avoid, as far as possible, the ruffling or rawing of opposing surfaces. Perhaps the most important precaution we can take is to maintain the integrity of the mucosa of the septum.

Curative.—When synechial adhesions are of recent origin, it is well not to attempt their destruction until they have become avascular. Otherwise the reaction set up by their division will result in a recrudescence of sprouting granulations, which may bridge the gap and renew the adhesion.

The knife or the galvano-cautery may be employed, and care should be taken not merely to divide the band, but to remove it entirely by cutting through it close to the septum and also close to its outer attachment, and it is often advantageous to remove that part of the turbinal to which the synechia is attached in order to widen the gap between the opposing raw surfaces. But of all the agents employed for the removal of synechiæ, none is so reliable as the diathermy terminal, as it is less liable to be followed by reactionary swelling and granulation-tissue formation. It should not, however, be carried too close to the septum or a perforation may be produced.

By attention to these details we generally succeed in obliterating synechiæ permanently, but sometimes, in spite of all our care, they persist in reuniting. When that takes place the best plan is to interpose some indifferent material between the raw surfaces. For this there is nothing better than a piece of indiarubber from the palm of a surgical rubber glove, worn continually for a week or ten days, being taken out, cleansed, boiled, and replaced daily between the raw surfaces.

INTRANASAL DACRYOCYSTOTOMY

is performed for stenosis of the nasal duct. It consists in making a permanent opening between the lacrymal sac and the interior of the nose in front of the middle turbinal. It is indicated in all forms of epiphora due to obstruction of the duct, whether the duct and sac have become infected or not.

The operation should be performed before slitting the canaliculus, and in preference to removal of the sac.

Operation.—The patient lies on his back with head and shoulders a



FIG. 133.—Nasal Dacryocystotomy. Approximate site of lacrymal sac and operation indicated by shading.

little raised; the surgeon stands on the right-hand side, or, if he prefers, on the side to be operated on.

If a general anæsthetic (chloroform) be employed, the anæsthetist is on the opposite side to the surgeon and a Junker apparatus is employed. Local anæsthesia suffices, however, and it is necessary even when a general anæsthetic is employed.

The site of the lacrymal sac corresponds to an area on the outer wall of the nose immediately anterior to the middle turbinal. (Fig. 133.) Here the sac may be in direct relationship with the bony wall of the nose and the nasal mucosa, but quite frequently an ethmoidal cell is interposed, and has to be traversed by the operator.

Local Anaesthesia is induced by the application of cocaine-adrenalin paste to this area, together with the injection of a few drops of 10 per cent. sol. cocaine with an equal quantity of sol. adrenalin (1-1000) by means of a lacrymal syringe into the sac through the canaliculus.

With a sharp knife passed into the nose under inspection a small flap of mucous membrane with the base below is turned down from the area referred to. With a long recurved chisel and a mallet, the underlying bone thus exposed is shaved off in thin layers so as to form a window. If there is no ethmoidal cell interposing, this lays bare the inner wall of the lacrymal sac.

A lacrymal probe is then passed through the inferior canaliculus into the sac, and pressing on the inner wall makes it project into the nose through the window in the bone we have just made.

The projecting sac-wall being thus made visible, it is seized from within the nose with a special pair of sharp-toothed catch-forceps, and secured, while a satisfactory piece of sac-wall is cut out either by fine-bladed scissors, or by a fine bistoury such as that used for submucous resection of the nasal septum. The flap of the mucous membrane may then be replaced, and retained with a light packing.

The object of the flap is to prevent granulation-tissue formation from the cut edge of the bone, as that readily leads by cicatrization to the closure of the artificial opening in the sac. But as a matter of fact, granulation-tissue always does form, and the best method of preventing cicatricial closure is to inspect the nose once a week for two or three months after the operation, and under cocaine to pick away the granulation-tissue as it forms, until finally the wound heals. (J. B. Horgan.)

Difficulties.—As an operative procedure dacryocystotomy presents the most extraordinary variations. Some cases are easily accomplished, while others are most tedious and difficult.

An ethmoidal cell may be interposed, and then when it has been opened up, the lacrymal sac lies at the bottom of a small fossa, the side of which prevents our view of the sac. This side must then be chiselled down until the sac-wall is exposed.

Sometimes a fossa of this kind exists without any ethmoidal cell, simply through the prominence of the ascending process of the superior maxilla, the bone of which is very hard and difficult to pare down with chisel or gouge.

If bleeding obscures the operation area, it can be controlled by pressure on the facial artery. (J. S. Fraser.)

In the most difficult cases, the operator may find it easier to abandon operation under inspection, and to operate under the guidance of the finger placed externally over the lacrymal groove. By exercising deep pressure, it is possible indeed to perform the whole operation with but occasional inspection of the interior.

Granulation-tissue may go on forming interminably after the operation, in spite of weekly efforts to reduce it. In that case we may bring about its cessation by removing a piece of the anterior end of the middle turbinal.

Results.—J. S. Fraser ('Journ. of Laryng.,' vol. xl, p. 725) reports 75 per cent. of cases cured; 11 per cent. improved; and 11 per cent. unaffected. The results are better in purulent dacryocystitis than in simple obstruction. Recurrence took place in 25 per cent. In such cases

the operation should be done again, as the recurrence is probably due to the cystostomy opening having contracted.

Epiphora in Intra-nasal Disease.—Epiphora is occasionally found in intra-nasal disease, especially in the following: Ethmoiditis, syphilis, lupus, neoplasms such as fibroma, carcinoma, sarcoma, and after operations on the maxillary antrum.

ENDONASAL OPERATIONS ON THE PITUITARY GLAND

It is possible to reach the sella turcica through the nose, and this is the route usually chosen nowadays in operating on cysts or tumours of the pituitary body.

Tumours of the pituitary body include slowly growing adenomata, some of which are cystic, and endotheliomata, which are malignant. They induce the symptoms of brain tumour with early eye symptoms, together with the phenomena of profound constitutional disturbance such as acromegaly, gigantism, adiposity, and so on, from the withdrawal or perversion of the pituitary secretion. These phenomena leading to an X-ray examination of the skull, distension of the sella turcica and other changes may be discovered.

Hirsch's operation consists in approaching the sella turcica by means of a submucous resection of the nasal septum (p. 253), carried back to, and through, the sphenoidal sinuses, the septum of which is removed to expose freely their posterior wall. The breaking down of this wall lays bare the sella turcica, where cysts, if present, may be opened, and solid tumours reduced by curetting, with much relief to the symptoms, and even in some few cases with cure.

The operation may be performed in stages, at intervals of two or three weeks, each stage being effected under local anæsthesia.

The chief difficulty consists in opening the sella in or near the middle line, so as to avoid the cavernous sinus. This step may be facilitated if performed under the guidance of X-rays.

More room for operating can be secured by removing turbinals and ethmoidal cells a few weeks before the submucous resection is performed.

The chief danger is post-operative meningitis, as it is difficult to keep this deep wound aseptic.

In addition to the Hirsch operation several other methods of approach have been proposed and carried out. Among them we may mention the sublabial septal resection (Cushing); the paranasal route of Chiari and Kahler; and the fronto-orbital route. (See 'The Pituitary Body and its Disorders,' by Harvey Cushing. Philadelphia and London, 1912.)

FOREIGN BODIES IN THE NOSE AND RHINOLITH

Children are fond of inserting foreign bodies into the nostrils. If noticed at the time, inspection will, of course, reveal the situation and

nature of the body; but if, as is not uncommonly the case, no one has observed the circumstance, the foreign body is allowed to remain, and after some years it becomes incrustated with lime-salts, forming what is known as a *rhinolith*. But although the nucleus of a rhinolith is almost always a foreign body, this is not invariably the case. Rhinoliths may be removed which on section show no signs of any nucleus.

In the course of time, which may be prolonged, Jobson Horne reporting a case of 30 years' duration, the foreign body or rhinolith makes for itself a nidus in the nose, being more or less encased in granulations and scar-tissue.

Symptoms.—Both foreign bodies and rhinoliths cause a unilateral muco-purulent discharge, with more or less nasal obstruction, and possibly some pain or occasional epistaxis. On examination the presence of the foreign body may be obscured by copious discharge, or by swelling of the turbinals; but the cleansing of the nostril, the application of cocaine to induce a shrinking of the swollen turbinals, and the cautious use of the probe, will generally result in the discovery of the body. As a rule, it will be found in the inferior meatus, fairly well back in the nose.

Removal is always painful and sometimes difficult, but it can usually be accomplished with a bent director inserted beyond the body. If, however, the substance is impacted, or if it is too large to be readily hooked out, a general anæsthetic should be given, and the mass extracted deliberately, being broken up with strong forceps if necessary and removed piecemeal. Every effort should be made to avoid increasing the damage already inflicted on the nasal mucosa and turbinals by the foreign body, as adhesions readily form, and at a later date may seriously obstruct the nasal passage.

Maggots in the Nose; Nasal Myiasis.—In warm climates, certain species of blow-fly are readily attracted to the nose, when, as in ozæna, the organ is disseminating an odour of putridity. The eggs laid in the nostril hatch out larvæ, which set about devouring the lining tissues of the interior of the nose, including the bones, and if not got rid of, they cause great destruction, which may even involve the meninges and lead to death.

Insects with this habit comprise the following: In the Malay Peninsula, India, Burma, Assam, Ceylon and tropical Africa, a blue-bottle fly (*Chrysomya bezziana*); in South Russia, Asia Minor, Palestine and Egypt, a flesh-fly (*Wohlfartia magnifica*); in India, Africa, North and South America, various blow-flies. In addition, several "warble bot-flies" are known to enter the nose and set up tissue irritation in order to feed on the body-fluids.

In Northern India, where nasal myiasis is common, the disease is known as "peenash."

The presence of the insects is unsuspected until the *symptoms* set in. These consist, first of all, of intolerable itching with nasal discharge, at first watery, and later purulent and blood-stained. The nose, eyelids and cheeks swell; the breath becomes extremely fœtid and headache may be severe. Examination of the nose may reveal the living maggots, but in

any case the destruction they cause and the consequent pain and distress they induce sooner or later lead to their discovery.

Treatment.—In warm countries ozænatous people should be warned to plug their nostrils with cotton-wool soaked in some antiseptic in order to prevent the entrance of insects.

If the larvæ are killed *in situ* serious sepsis follows. Consequently the best plan is to syringe the passages frequently with weak chloroform water, or to apply turpentine locally, so as to make the larvæ creep out. In early cases, recovery without serious disturbance follows these simple measures. (W. S. Patton, 'Journ. of Laryng.,' vol. xxxviii, p. 18.)

Rhinosporidiosis. (See J. H. Ashworth and A. Logan Turner, 'Journ. of Laryng.,' vol. xxxviii, p. 285.)

Among the relatively few fungi which become parasitic on human living tissues is what is called the *Rhinosporidium Seeberi* or *Kinvalgi*, found in India and the Argentine, and producing characteristic lesions in the nasal mucosa. It may also attack the naso-pharynx, the uvula, the lacrymal sac, aural polypi, and the penis.

In the nose the septum and turbinals are invaded and undergo hyperplastic change with the formation of pedunculated, polypus-like growths. In the uvula papillomatous changes appear.

Symptoms.—In the nose the overgrowth is dull pink or reddish in colour, with slender filiform or leaf-like processes, the surfaces of which are studded with minute pale spots—the sporangia.

The polypi are friable and bleed readily when touched. A viscid discharge containing sporangia and spores accompanies the disease. Removal of the growths is followed after a time by recurrence.

Microscopically, the tissue resembles that of the ordinary mucous polyp, but the fungus in various stages of its development can be seen scattered about.

Treatment.—Hitherto surgical removal has been the only remedy employed, but recently spraying the nose with 2 per cent. sol. antimon. tartrat. in water, or applying it on gauze packs, has been suggested, as that remedy has proved successful when the eye has been attacked. Potass. iodid. internally, a useful agent in other fungoid diseases, might also be tried.

(For *Rhino-mycosis*, see p. 388.)



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